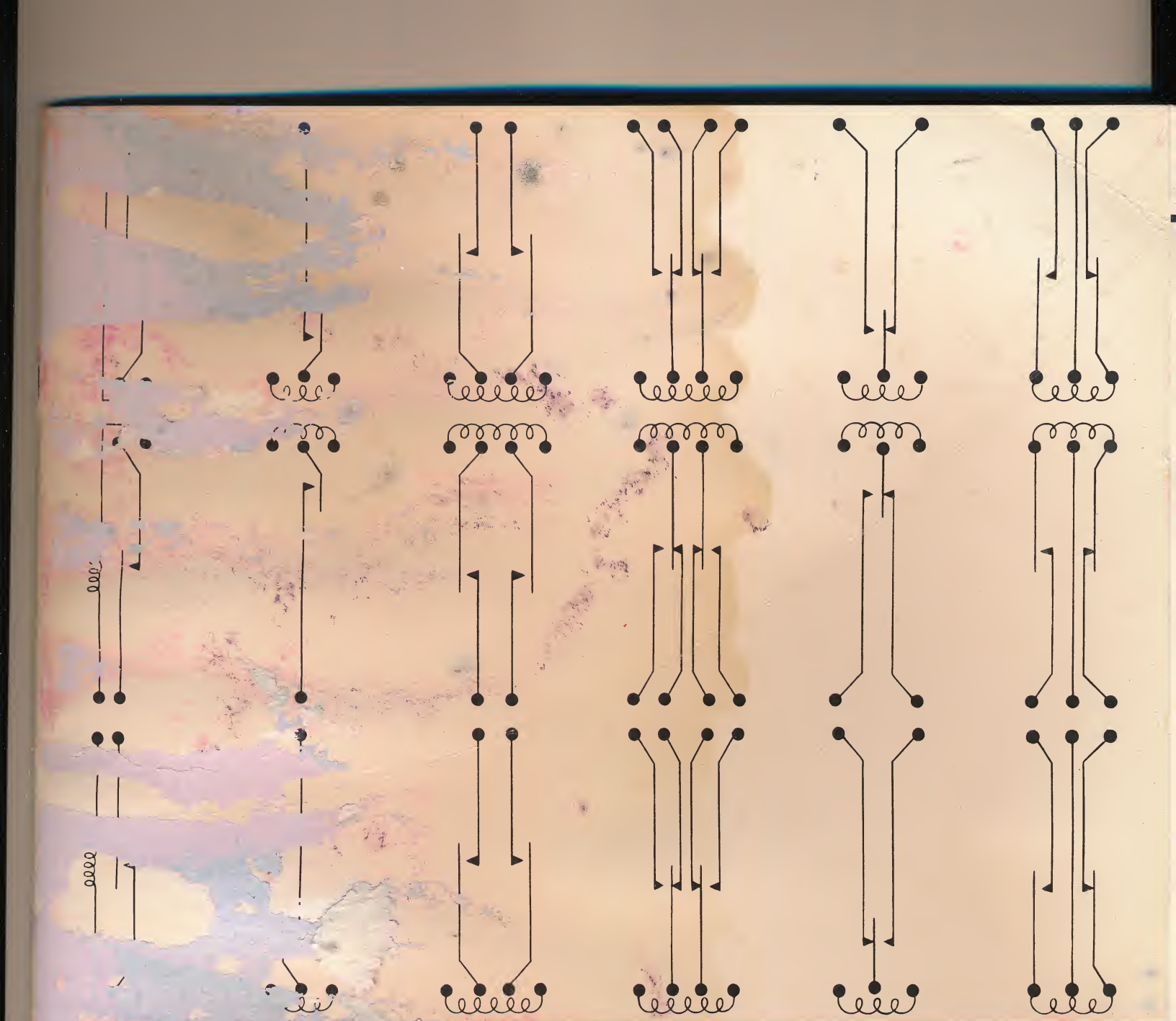

HIGH RELIABILITY

MAGNECRAFT

RELAYS

CATALOG 165

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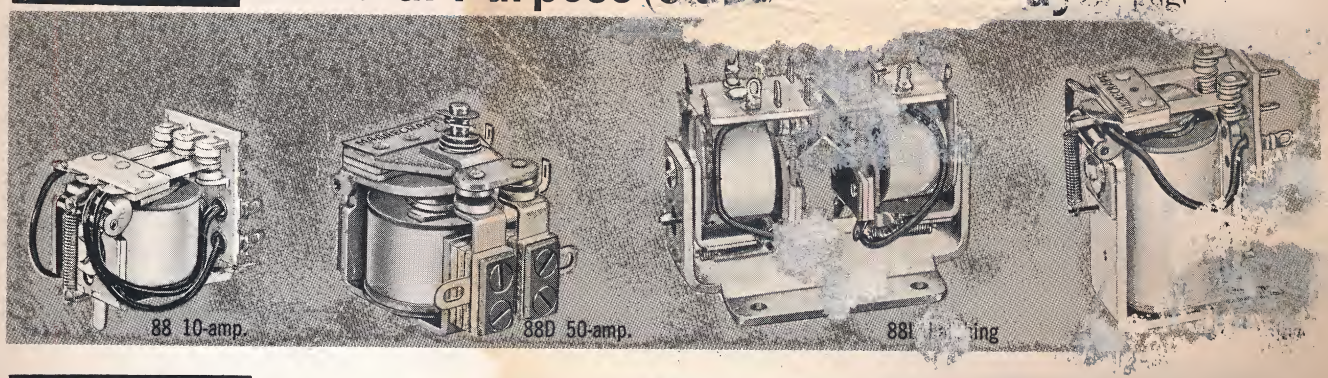
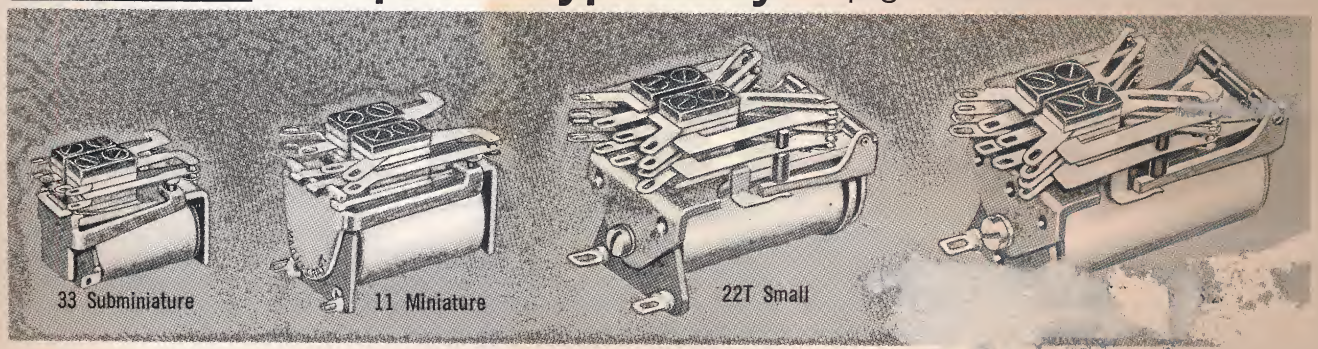
SECTION I General Purpose (cla[illegible]per [illegible]page[illegible]



SECTION II Telephone Type Relays —pages 14 to 34



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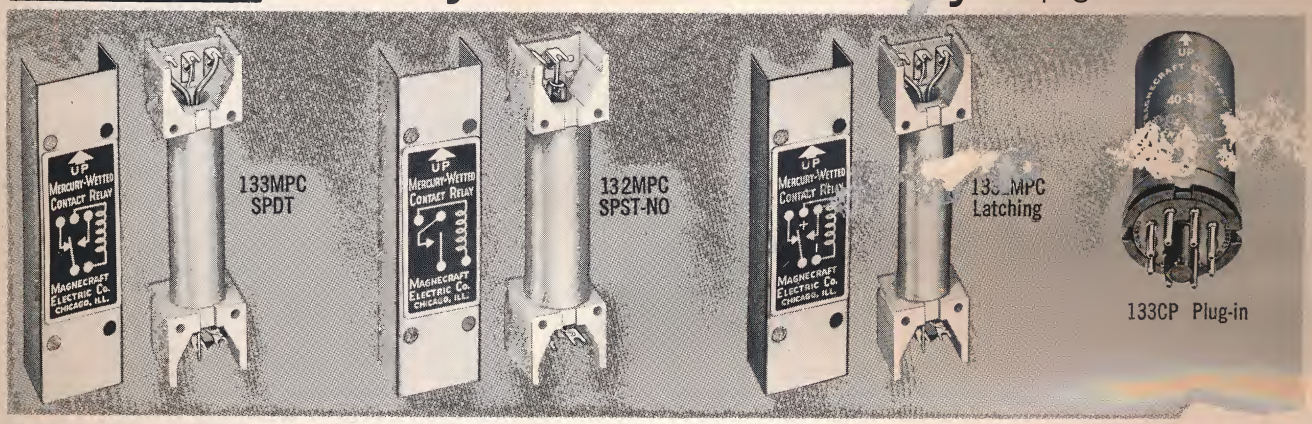

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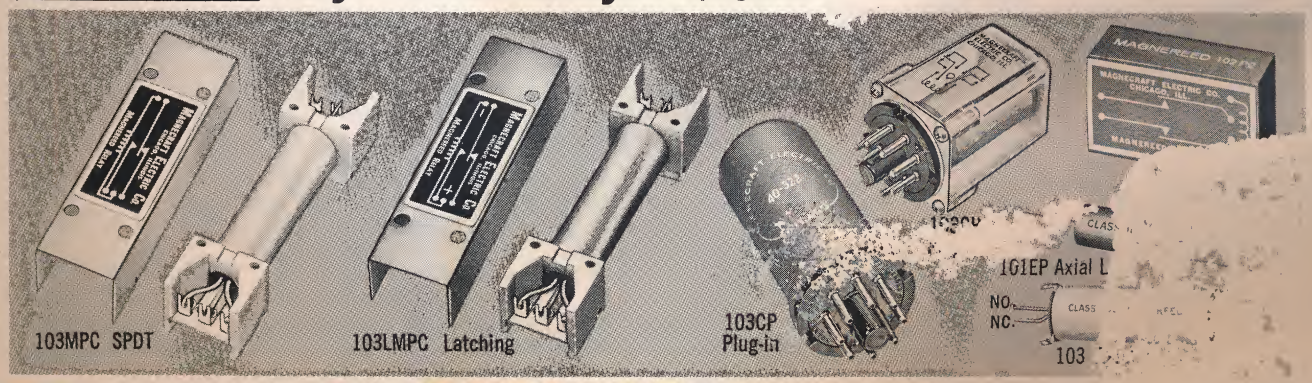

WHERE TO LOOK

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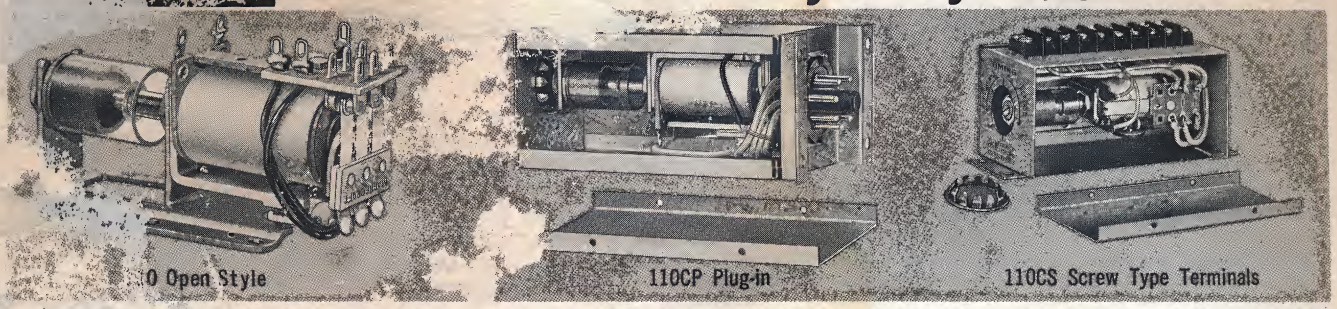

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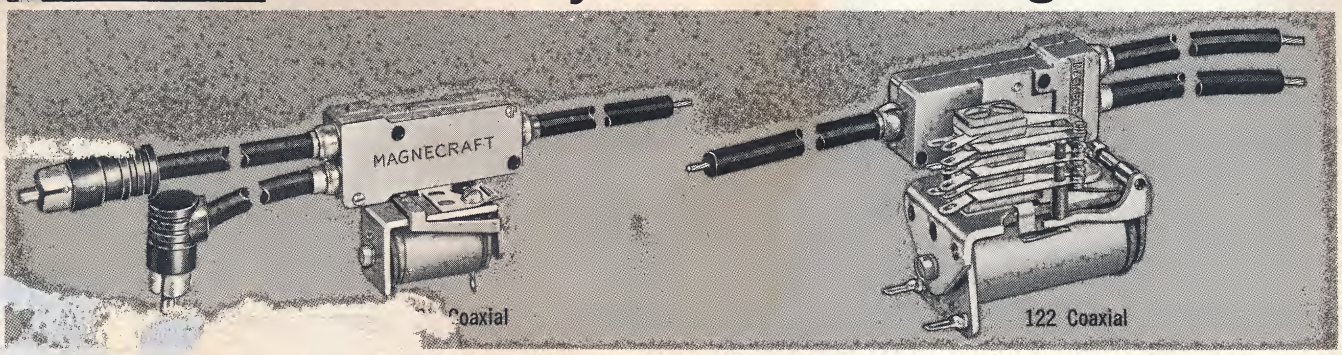
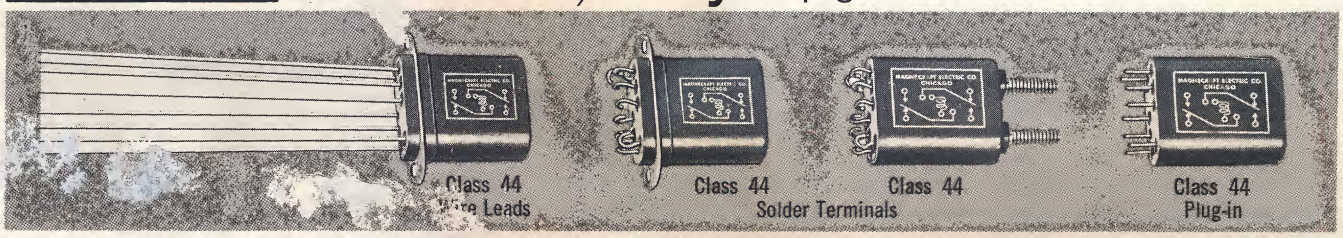


SECTION VI — ...stal Can) Relays —pages 48 and inside back cover



RELAY GUIDE

Type of Relay	PAGE NUMBERS						
	General Purpose	Telephone	Mercury Wetted	Dry Reed	Air Dashpot	Coaxial	Crystal Can
Antenna Switching		15				46, 47	
High Voltage		16		38			
[illegible]	11	21	37	39			
Low Level Switching		24	36	38			
Quick Disconnect Term.		25					
Power	10, 13	19, 25, 32					
Printed Circuit		15, 19	36, 37	38 to 41			
Sensitive	6, 12	22, 30, 33	36, 37	38 to 41			
Shock Resistant		14, 18					48
[illegible] Term.		24					
[illegible]	13	23, 31			42 to 45		
[illegible]	12	24, 32					
[illegible]		14, 13					48
[illegible]		14, 18					48
[illegible]		24					
[illegible]		28					

Relays to YOUR specifications

The principal business of MAGNECRAFT Electric Co. is the development and manufacture of high reliability relays to meet application requirements.

Many of these custom-built relays have proved widely adaptable and are listed in the following pages as "Stock Relays", which may be ordered by Stock Part Number.

Where either Stock Relays or Standard Relays require modification to meet application requirements, such as different contact rating or arrangement, different coil voltage or resistance, etc., many customers use the Stock Part Number or the Standard Catalog Number and specify the required change.

Some of the more frequently used variations, mountings and enclosures are shown following the introduction of each relay class but these are a very small part of the endless variations available. When you do not find the relay you need, just send to MAGNECRAFT the specifications you have to meet as outlined in the adjoining column.

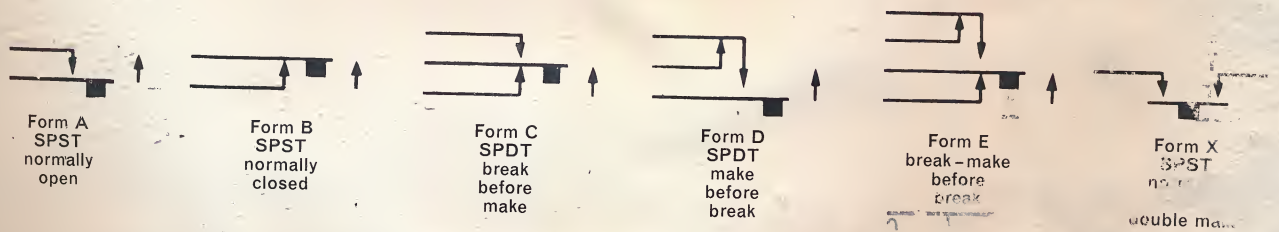
Ordering Information for Custom-Built Relays

MAGNECRAFT Engineers are glad to co-operate in selecting, adapting or engineering relays to meet your application requirements. For this purpose they need the following information:

1. The MAGNECRAFT Relay Class (or type, make and model of relay made by others).
2. Contact combination.
3. Contact Load: Volts and Amperes.
4. Type of Loads: (Resistive, inductive, etc.)
5. Nominal Coil Voltage or Coil Current.
6. Pull-in voltage or current. DC Coil Resistance.
7. Operate Time. Release Time.
8. Duty Cycle. Ambient Temperature. Required Life.
9. Unusual or severe environmental conditions.
10. Applicable military specifications.
11. Type of mounting and type of terminals.
12. Enclosure—hermetically sealed, dust tight, etc. Specify Magnecraft Enclosure Number or give maximum enclosure dimensions.
13. Special features or conditions.
14. Quantity required.

When ordering STOCK RELAYS it is only necessary to SPECIFY the STOCK PART NUMBER.

STANDARD CONTACT COMBINATIONS



Standard Arrangement of Contact Forms

Figure 1 illustrates the sequence in which the different contact forms are normally arranged in telephone type relays.

This arrangement is used because it provides ease of adjustment, the most effective use of armature force and optimum distribution of contact pressure.

Other arrangements can be furnished on custom built relays when required.

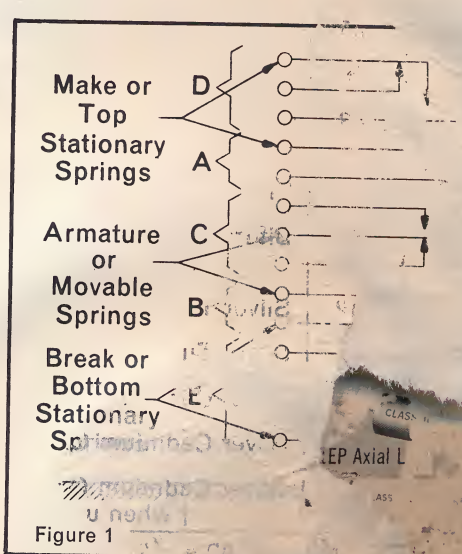


Figure 1

OPERATE DATA CONTACT CODES

*Minimum Operate Milliwatts (Sensitivity)—Conservative Values

Contacts	RELAY CLASS					
	11	22	33	66‡	88	87
SPDT	150	100	250	60	125	80
DPDT	300	200	500	120	250	160
3PDT	500	320	800	200	375	240
4PDT	700	450	1100	300	—	—

*Minimum milliwatts required to operate the specified contact combination. All values measured at 25° C using a regulated DC voltage source.
‡For 35 milliwatt sensitivity see page 33.

*Operate and †Release Time—Milliseconds Maximum

Contacts	Class 11		Class 22		Class 33		Class 66		Class 88		Class 87	
	Operate	Release	Operate	Release	Operate	Release	Operate	Release	Operate	Release	Operate	Release
SPDT	11.5	7.0	9.5	13.0	5.5	3.0	9.0	13.0	18.0	30.0	20.0	30.0
DPDT	12.5	4.5	11.5	6.0	6.5	3.0	13.0	7.0	20.0	28.0	22.0	28.0
3PDT	14.5	3.5	12.5	3.5	8.0	2.5	14.0	5.5	24.0	26.0	26.0	26.0
4PDT	19.0	3.0	16.0	3.5	10.0	2.0	16.0	4.0	—	—	—	—

Contacts	Class 103		Class 104		Class 133	
	Operate	Release	Operate	Release	Operate	Release
SPDT	2.0	3.0	2.0	3.0	3.0	3.0
DPDT	3.0	3.0	2.0	3.0	—	—

*Operate Time includes the period between the energizing of the coil and closing of the normally open contacts.

†Release Time includes the period between the start of voltage drop and closing of the normally closed contacts.

All operate and release values shown measured at +25°C using a regulated 26.5 VDC source; using standard coils; without adjustable armature residual screw, and with optimum pull-in adjustment of the relays.

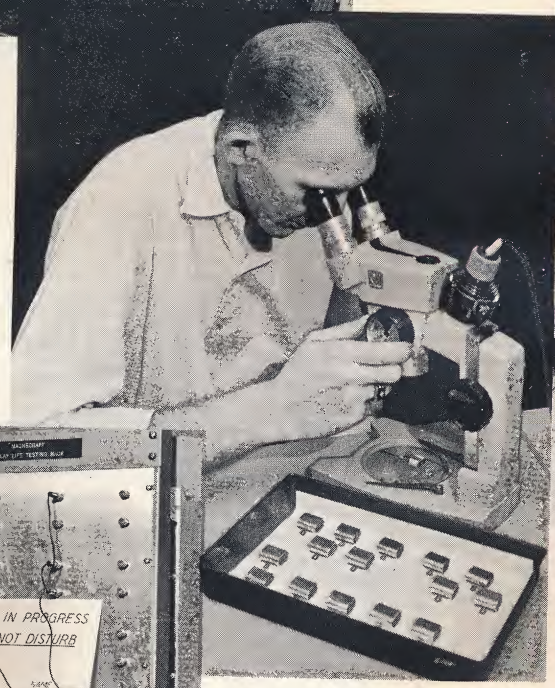
Code	Contact Material	Contact Dimensions		Nominal* Rating	Relays on which available
		Base Dia.	Thickness		
104	Palladium	.075″	.020″	3 amp.	11, 22, 33, 66
105	Silver Cadmium Oxide	.125″	.020″	5 amp.	11, 22, 33, 66
106	Bifurcated Palladium	.062″	.020″	4 amp.	22T, 66T
108	#1 Gold Alloy	.062″	.020″	For low level signal circuits	11, 22, 33, 66
109	Silver Cadmium Oxide	.187″	.047″	10 amp.	22R, 66R
111	Bifurcated #1 Gold Alloy	.062″	.020″	For low level signal circuits	22T, 66T
112	Silver Tungsten	.187″	.050″	12 amp.	22R, 66R
118	Silver Tungsten Carbide	.250″	.050″	15 amp.	22R, 66R
120	Silver Cadmium Oxide	.187″	.046″	10 amp.	87, 88
	Silver Oxide	.250″	.050″	15 amp.	88R
	Oxide	.250″	.050″	50 amp.†	11D, 88D
	sed in DOUBLE BREAK CONTACTS				
	switch			10 amp. @ 115 VAC	22SA

Dry Circuit Switching Relays undergoing final inspection run-in tests.

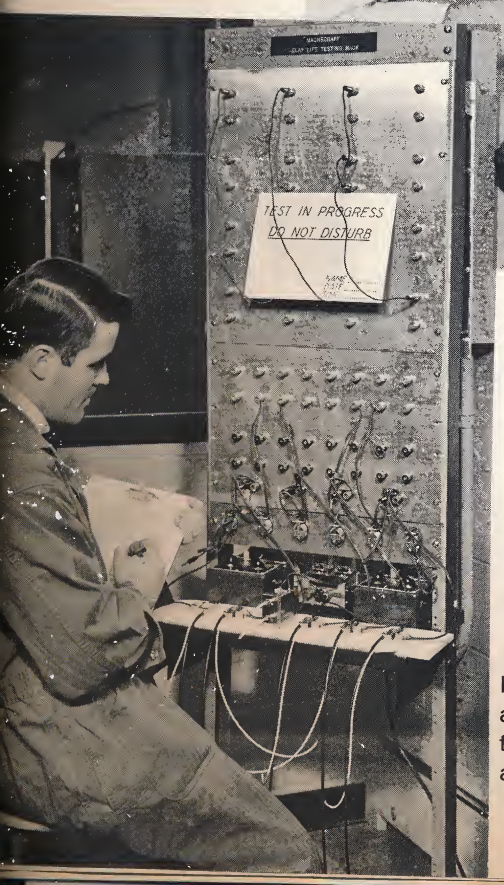
Operate and Release Time test—assures full compliance of relay performance to specifications

The unceasing vigilance of dedicated ----

Precision gages used for accurate mechanical inspection of all parts



Microscopic inspection of Micro-Miniature Relays in production



Extended life tests are in constant operation to maintain and advance product quality

Low temperature testing of hermetically sealed relay performance.

High voltage breakdown test of insulation material assures complete compliance with Magnecraft rigid standards.

Testing Voltage Standing Wave Ratio of high frequency coaxial relays.

MEN and WOMEN maintains the HIGH RELIABILITY of MAGNECRAFT Relays

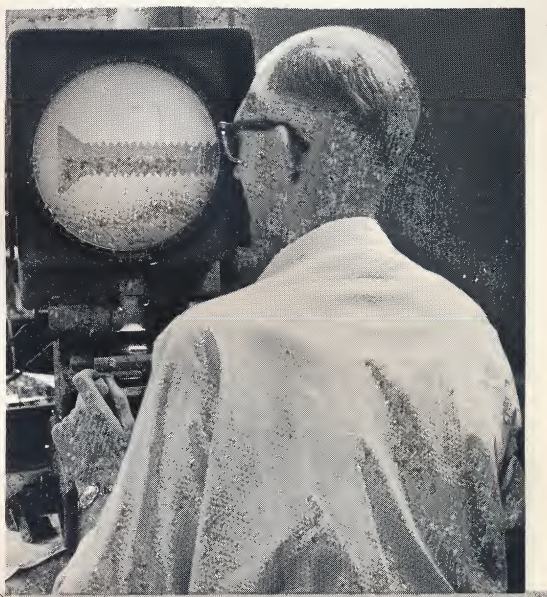
The recognized high reliability of Magnecraft Relays results from a uniquely thorough system of quality control.

Life testing and research continuously seek even minute improvements in construction and materials.

Finished parts are precision inspected before assembly. Sub-assemblies are thoroughly inspected at each stage. Samples are regularly taken from assembly lines for critical inspection and life testing.

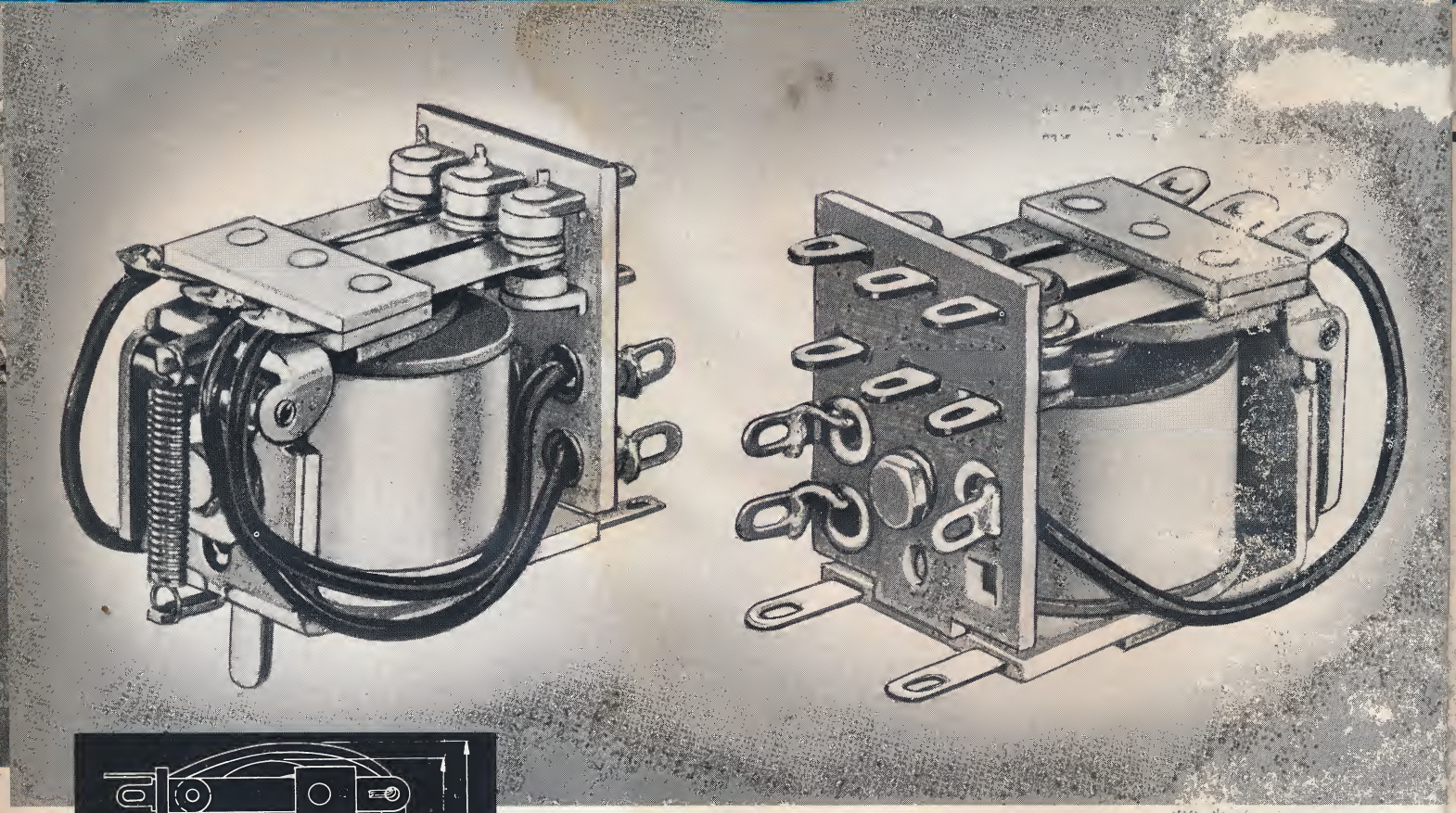
Each Magnecraft Relay receives detailed inspection and tests for conformity to customer specifications before shipment.

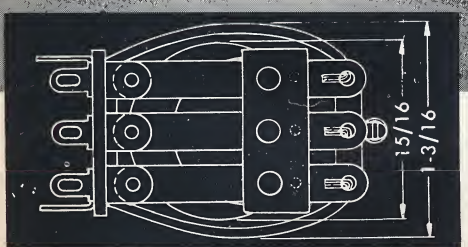
Due to the thoroughness of Magnecraft Quality Control you can specify Magnecraft Relays with complete assurance.

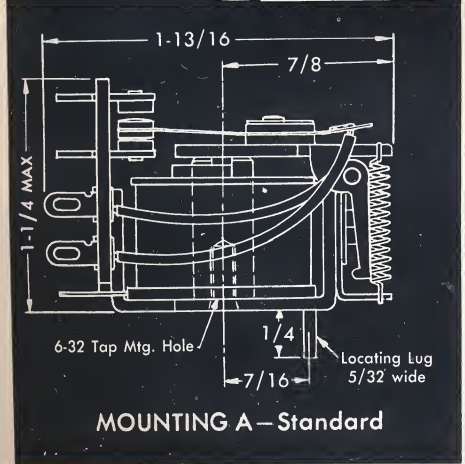


Optical Comparator test for minute parts— typical of rigid quality control procedures and standards.

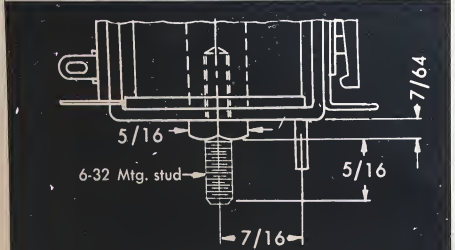
Each Magnecraft Relay receives detailed inspection for conformity to customer's specifications before shipment.







MOUNTING A—Standard



MOUNTING B
Furnished when specified

Send for STOCK RELAY CATALOG with latest prices.

High Reliability General Purpose Relay

For AC and DC operation

Class 88 MAGNECRAFT Relays are an abrupt departure in clapper type relay design. Dimensionally interchangeable with relays made by others the 88 has been developed to provide Telephone Type Relay reliability at general purpose relay prices.

Unique in relays of this type MAGNECRAFT 88 Relays have rugged, precision-built hinge-pin armature bearings with oversize bearing surfaces —the same construction used in the finest telephone type relays for lowest friction and maximum contact effectiveness with stabilized adjustment over long life.

Glass insulation provides great dielectric strength unaffected by humidity and temperature changes.

Molded Nylon bobbins with ruggedized coil terminal inserts eliminate possibility of shorts.

Built-in contact wipe with riveted contacts further advance reliability through long life.

SPECIAL RELAYS—MAGNECRAFT designs and builds Relays to meet special requirements. In case you do not find the relay you need just send the complete specifications you have to meet.

Class 88—Sensitivity—Operate and Release Time

	SPDT	DPDT	3PDT
Min. Operate MW (sensitivity)	125	250	375
Operate Time — MS maximum	18.0	20.0	24.0
Release Time — MS maximum	30.0	28.0	26.0

COIL DATA

1. Standard operating voltages are listed in Table A. Available for intermediate and higher operating voltages up to 220 volts, D.C. and 230 volts, 60 cycle A.C.
2. D.C. Power Requirements: Nominal, 1.5 watts; minimum, .125 watts; maximum for continuous duty, 3.5 watts.
3. A.C. nominal volt-ampere requirements, 3 VA.
4. D.C. Resistance—to 20,000 ohms.
5. Insulation to ground tested at 750 V. A.C., RMS, standard.
6. Terminals—solder type (standard) or wire leads.

CONTACTS

1. Code 120: Silver cadmium oxide gold flash, .187 dia. x .046 thick, rated 10 amperes at 115 VAC or 32 VDC non-inductive load are standard.
2. Standard contact arrangements; SPDT DPDT and 3PDT for A.C. and D.C.
3. Standard insulation—fiber glass melamine—tested at 750 volts A.C., RMS, for breakdown to ground.

Code 121: Silver Cadmium Oxide Gold flash, .205 dia. x .050 thick, rated 15 amperes* (see 88R, page 10).

Code 122: Silver Cadmium Oxide Gold flash,. 250 dia. x .050 rated 50 amperes* when used in DOUBLE BREAK CONTACTS (see 88D, page 10).

*at 115 VAC or 32 VDC, non-inductive load.

Class 88 Variations

ORDERING INFORMATION

Order STOCK or STANDARD Relays by Catalog (Part) Number.

When ordering or requesting information about special relays please specify:

1. Type (Magnecraft Class No.) with type and number of enclosure if desired.
2. Operating Coil Voltage or Current—AC or DC.
3. Contact Combination required.
4. Contact load in volts and amperes.
5. Type of load—inductive, non-inductive, motor, lamp, heater, etc.

Table A—Class 88 Relays in stock for immediate delivery

CONTACTS: Code 120—Silver Cadmium Oxide gold flash, rated 10 amperes at 115 VAC or 32 VDC, non-inductive load.

†volt. or current	res. ohms	nominal power	Stock Part Numbers SPDT	DPDT	3PDT
alternating current voltage actuated					
6VAC			W88AX1	W88AX5	W88AX9
12VAC			W88AX2	W88AX6	W88AX10
24VAC	—	3 VA	W88AX3	W88AX7	W88AX11
115VAC			W88AX4	W88AX8	W88AX12
230VAC				W88AX32	W88AX36
direct current voltage actuated					
6VDC	25		W88X2	W88X6	W88X10
12VDC	100		W88X3	W88X7	W88X11
24VDC	400	1.5W	W88X4	W88X8	W88X12
110VDC	8000		W88X5	W88X9	W88X13
DC current actuated for plate circuit operation					
7.2 MA	2500		W88X14		
5.0 MA	5000	125MW	W88X15		
3.6 MA	10000		W88X16		
10 MA	2500			W88X17	
7.2 MA	5000	250MW		W88X18	
5 MA	10000			W88X19	
12.3 MA	2500				W88X20
8.7 MA	5000	375MW			W88X22
6.1 MA	10000				W88X22

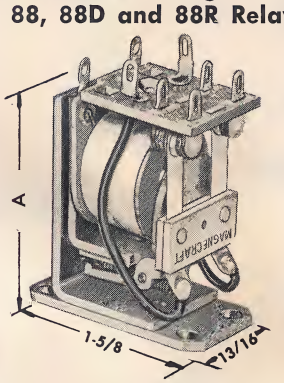
†Voltage operated relays pull in at 85% of nominal voltage

Table 8—Class 88 Standard Coil Data Chart

Wire	Turns	Ohms*	Wire	Turns	Ohms*	Wire	Turns	Ohms*
28	600	6	34	2400	100	40	10000	2000
29	650	9	35	2800	150	41	12000	2500
30	760	12	36	3214	200	42	15200	4000
31	1000	25	37	5100	400	43	16500	5000
32	1400	40	38	5460	480	44	21000	8000
33	1600	50	39	7600	1000	44	24000	10000

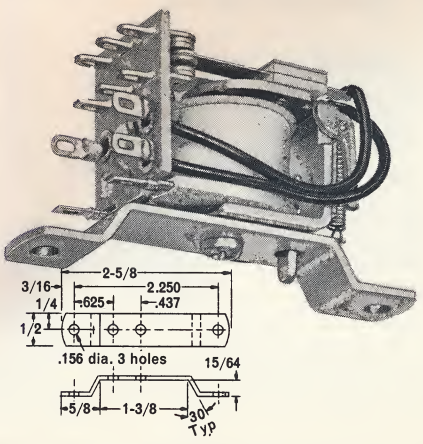
* Plus or minus 10% at +25°C

No. 16-201 Mounting Bracket for 88, 88D and 88R Relays.

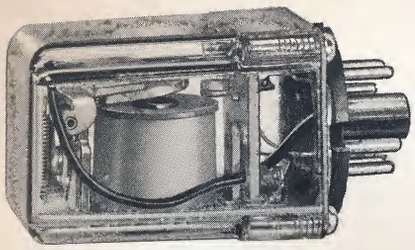


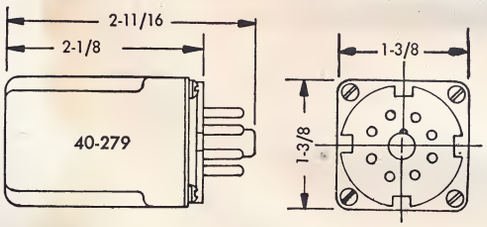
Dimension A, Class 88 1-31/32
Dimension A, Class 88D 1-15/16
Dimension A, Class 88R 2-1/32

No. 16-229 Mounting Bracket for 87, 88, 88R and 88D Relays



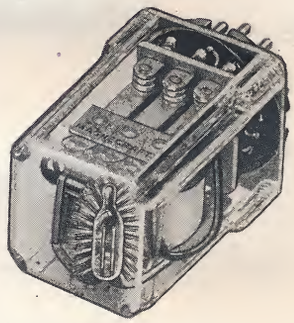
Class 88 Relays in No. 40-279 Plug-in Mounted "See-thru" Dust Cover





88CP Class 88 Relay with No. 40-279 enclosure of high impact styrene and 8- or 11-pin Octal Style Phenolic Plug (mate Amphenol Socket No. 77-MIP-8 or 11 or equivalent) Permits visual inspection protects against dust and tampering, insulates the relay from other components. SPDT and DPDT Relays have 8-pin plug; 3PDT Relays have 11-pin plug.

88ANCP Class 88 Relay with built-in neon indicator light in No. 40-279 plug-in enclosure described at left. The neon light comes on when the relay is energized. Shows whether the coil is energized at a glance without the expense of mounting and wiring an indicator light.



built-in neon circuit indicator light

Table B—Class 88CP Relays in stock for immediate delivery

CONTACTS: Code 120—Silver Cadmium Oxide gold flash, rated 10 amperes at 115 VAC or 32 VDC, non-inductive load.

†volt. or current	res. ohms	nominal power	Stock Part Numbers SPDT—WD-1	DPDT—WD-2	3PDT—WD-3
alternating current voltage actuated					
6VAC	—	3 VA	W88ACPX1	W88ACPX5	W88ACPX9
12VAC			W88ACPX2	W88ACPX6	W88ACPX10
24VAC			W88ACPX3	W88ACPX7	W88ACPX11
115VAC			W88ACPX4	W88ACPX8	W88ACPX12
230VAC				W88ACPX32	W88ACPX39
direct current voltage actuated					
6VDC	25	1.5W	W88CPX1	W88CPX5	W88CPX9
12VDC	100		W88CPX2	W88CPX6	W88CPX10
24VDC	400		W88CPX3	W88CPX7	W88CPX11
110VDC	8000		W88CPX4	W88CPX8	W88CPX12
DC current actuated for plate circuit operation					
7.2 MA	2500	125 MW	W88CPX13		
5.0 MA	5000		W88CPX14		
3.6 MA	10000		W88CPX15		
10 MA	2500	250 MW		W88CPX16	
7.2 MA	5000			W88CPX17	
5 MA	10000			W88CPX18	
12.3 MA	2500	375 MW			W88CPX19
8.7 MA	5000				W88CPX20
6.1 MA	10000				W88CPX21

†Voltage operated relays pull in at 85% of nominal voltage

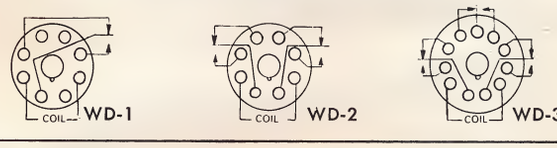
Table C—Class 88ANCP Relays in stock for immediate delivery

CONTACTS: Code 120—Silver Cadmium Oxide gold flash, rated 10 amperes at 115 VAC or 32 VDC, non-inductive load.

†volt. or current	nominal power	Stock Part Numbers SPDT—WD-1	DPDT—WD-2	3PDT—WD-3
alternating current voltage actuated				
115VAC	3VA	W88ANCPX-1	W88ANCPX-2	W88ANCPX-3

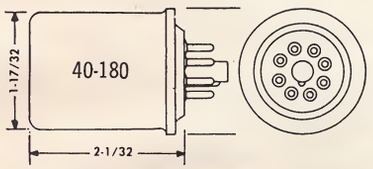
†Voltage operated relays pull in at 85% of nominal voltage

Wiring Diagrams for Class 88 Plug-in Mounted Relays.



88HP with 40-180 Hermetically Sealed (or dust tight) Enclosure.

40-180



Available with Class 88 Relays; contact combinations to DPDT. 8-pin octal plug, mates MIP-8 Amphenol socket or equiv.

Stock Relays, Table D have 40-180 enc.

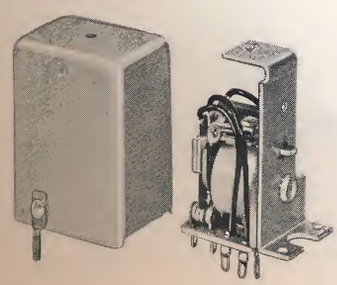
Table D—Class 88HP Relays—in stock for immediate shipment

CONTACTS: Code 120—Silver Cadmium Oxide gold flash, rated 10 amperes at 115 VAC or 32 VDC, non-inductive load.

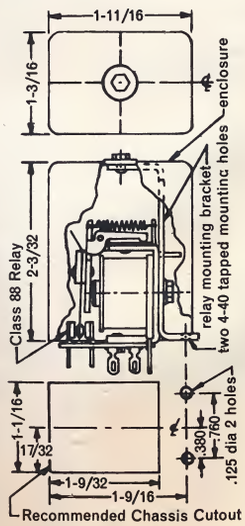
†volt. or current	res. ohms	nominal power	Stk. Part No. DPDT—WD-2
alternating current voltage actuated			
6VAC	—	3VA	W88AHPX21
12VAC			W88AHPX22
24VAC			W88AHPX23
115VAC			W88AHPX24
direct current voltage actuated			
6VDC	25	1.5W	W88HPX32
12VDC	100		W88HPX33
24VDC	400		W88HPX34
110VDC	8000		W88HPX35

†Voltage operated relays pull in at 85% of nominal voltage

40-365 Low Cost Dust Cover for Class 88 Relays



Aluminum, natural finish. Available with Class 88 Relays, contact combinations to 3PDT. Solder type terminals for contacts and coil.



Cut on this line

Class 88 Relays with Hermetically Sealed (or dust tight) Enclosures

RELAY APPLICATION FORM

Check List of information for ordering Relays and for requesting Application Recommendations. Fill in applicable data.

Company _____ Date _____

Address _____

Individual _____ Title _____

Company Part No. _____ Company Ref. No. _____

Type of: Magnecraft Class Relay : or Type of other make _____

Contact Combination _____ Contact load volts _____ Contact load amps. _____

Type of Contact Load: (Resistive, inductive, etc.) _____

Required Life _____

Nominal Coil voltage or current _____ Pull-in voltage or current _____

Drop-out voltage or current (if applicable) _____ DC Ohms Resist. _____

Ambient Temperature _____ Duty : Continuous ☐ Cycle: Intermittent ☐

Operate Time _____ Release Time _____

TERMINALS Plug-in ☐ Printed Circuit ☐ Solder ☐ Taper Tab. ☐ Other ☐

ENCLOSURE Hermetically Sealed Enc. No. _____ Dust Cover Enc. No. _____

Type and maximum dimensions of enclosure if not standard _____

Applicable MIL. SPECS. _____

Quantity Required _____

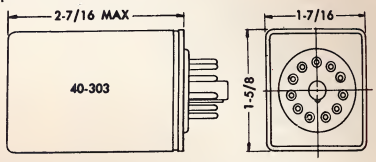
Special Features _____

Send to MAGNECRAFT ELECTRIC CO.,
5575 North Lynch Avenue, Chicago, Ill. 60630

Cut on this line

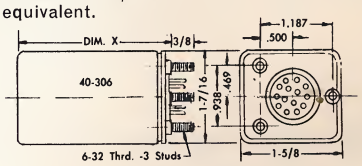
40-303 for 88 HP

Available with Class 88 Relays; contact combinations to 3PDT. Heavy Duty Glass to Metal Octal Plug; 8-pin to DPDT; 11-pin for 3PDT. Mate Amphenol Socket 77MIP-8 or -11 or equivalent.

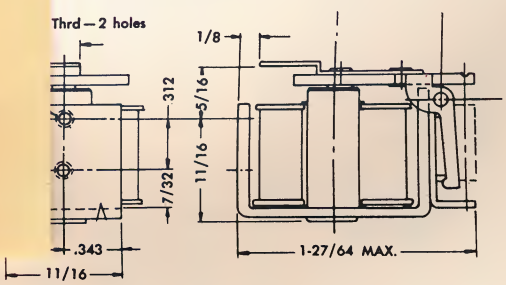


40-306 for 88HP

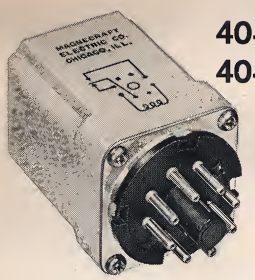
Available with Class 88 Relays; contact combinations to 3PDT—14-pin miniature plug.
40-306-1: X is 2-11/32 MAX. based on 1/16th chassis. Mates Cinch 54A14775 or equivalent (under chassis mounting).
40-306-2: X is 2-3/4 MAX. Mates Cinch 54A16640 or equivalent.



ated Actuator



Class 88 Relays with Hermetically Sealed (or dust tight) Enclosures

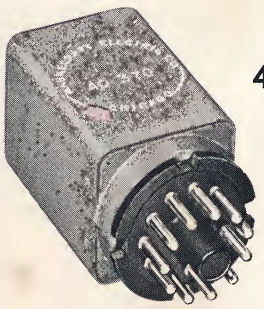


40-279-15
40-279-16

High-Temp NYLON Enclosure

88CP Class 88 Relay with high heat resistant, non-aging, crack resistant, enclosure of opaque Nylon and Octal Style Phenolic Plug. 40-279-15 has 8-pin plug for SPDT and DPDT. 40-279-16 has 11-pin plug for 3PDT. (Plugs mate Amphenol Sockets No. 77MIP-8 and 77MIP-11 or equivalent) Dimensions same as 40-279 enclosure on page 8. For ordering convenience use Catalog Numbers in Table B, page 8, and specify "with Opaque Nylon Enclosure instead of See-thru Styrene".

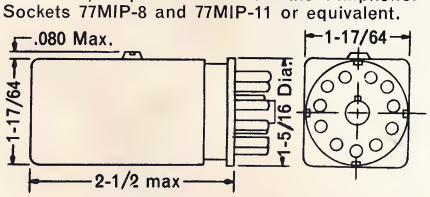
MAGNECRAFT designs and builds Relays to meet special requirements. In case you do not find the relay you need just send the complete specifications you have to meet.

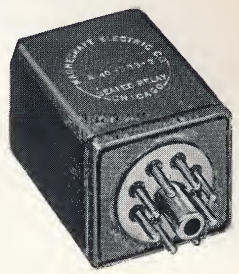


40-370 for 88 HP

Metal Enclosure

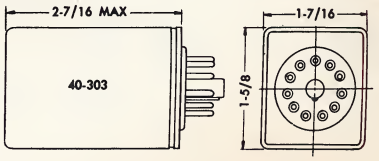
Available with Class 88 Relays, contact combinations to 3PDT. Octal Style Phenolic Plug, 8-pin to DPDT, 11-pin for 3PDT. Mate Amphenol Sockets 77MIP-8 and 77MIP-11 or equivalent.





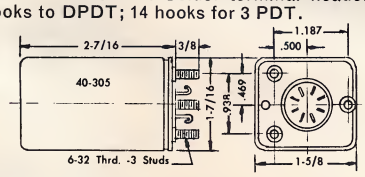
40-303 for 88 HP

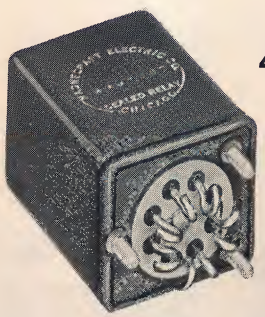
Available with Class 88 Relays; contact combinations to 3PDT. Heavy Duty Glass to Metal Octal Plug; 8-pin to DPDT; 11-pin for 3PDT. Mate Amphenol Socket 77MIP-8 or -11 or equivalent.



40-305 for 88HS

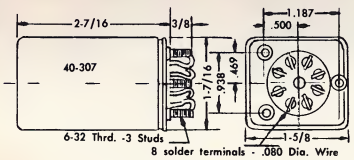
Available with Class 88 Relays; contact combinations to 3PDT. Solder terminal header; 8 hooks to DPDT; 14 hooks for 3 PDT.





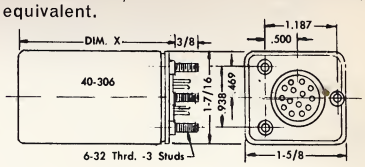
40-307 for 88HS

Available with Class 88 Relays; contact combinations to DPDT. 8-hook heavy duty solder terminal header.

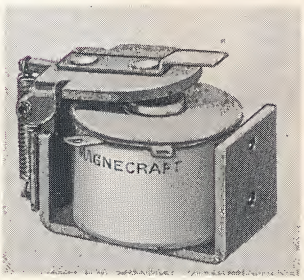


40-306 for 88HP

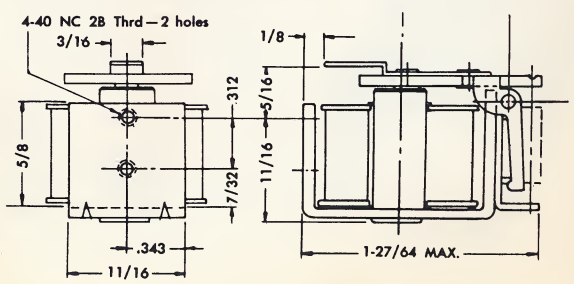
Available with Class 88 Relays; contact combinations to 3PDT—14-pin miniature plug.
40-306-1: X is 2-11/32 MAX. based on 1/16th chassis. Mates Cinch 54A14775 or equivalent (under chassis mounting).
40-306-2: X is 2-3/4 MAX. Mates Cinch 54A16640 or equivalent.

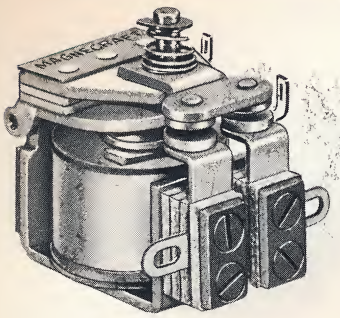


Class 88 AC and DC Magnetically Operated Actuator



Has the same quality construction and advanced pin type armature hinge design as Class 88 Relays. May be used for actuating levers, interlocks, switches, shutters, valves and other devices where remote electromechanical control is required.





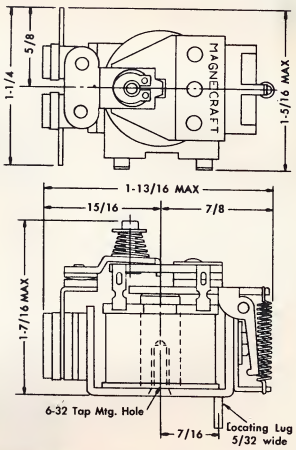
88D 50-Ampere Power Relay

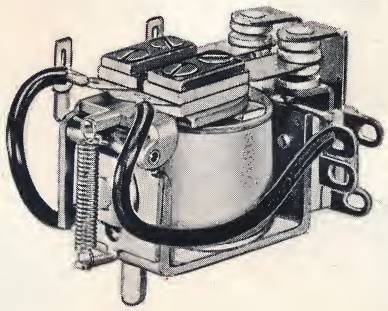
This is the high reliability Class 88 Relay specially designed with 50-ampere, single pole, single throw, double break, normally open contacts.

Developed especially for switching heavy current in minimum space reliably and economically.

In addition to the high reliability features described on page 8, the 88D has a unique contact structure which provides positive contact wiping action as the contacts make and break.

One tapped mounting hole for 6-32 screw is standard. Mounting B shown on page 8 furnished when specified.





88R 15-Ampere Power Relay

The high reliability Class 88 Relay with 15 ampere heavy duty silver alloy contacts for industrial control applications.

The 88R has all the high reliability features described on page 8. In addition contacts, and terminals are especially rugged to provide long life reliability in industrial service.

Available to DPDT for DC and AC, 60 cycle, operation.

One #6-32 tapped mounting hole and locating lug is standard mounting. Mounting B, shown on page 8, furnished when specified.

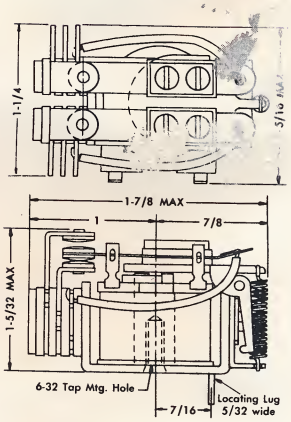


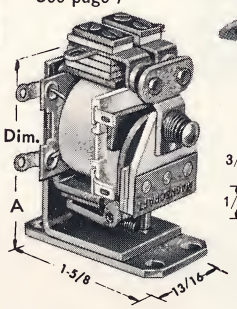
Table F—Class 88D Relays—in stock for immediate shipment

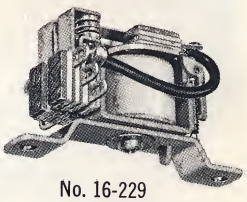
CONTACTS: Code 122—Silver Cadmium Oxide gold flash, DOUBLE BREAK, rated 50 amperes at 115 VAC or 32 VDC, non-inductive load.

†volt. or current	res. ohms	nominal power	Stk. Part No. SPST-NO
alternating current voltage actuated			
24VAC 115VAC 230VAC		3 VA	W88ADX-1 W88ADX-2 W88ADX-3
direct current voltage actuated			
6VDC 12VDC 24VDC 110VDC	25 100 400 8000	1.5W	W88DX-1 W88DX-2 W88DX-3 W88DX-4

†Voltage operated relays pull in at 85% of nominal voltage

16-201 Mtg. Brkt. for 88, 88R, 88D
Dim. A: 88R, 2 1/32
Dim. A: 88D, 1 15/16
See page 7





No. 16-229 Mounting Bracket for 88, 88R, 88D

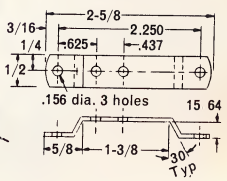


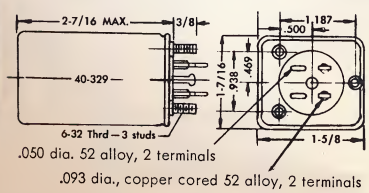
Table E—Class 88R Relays—in stock for immediate shipment

CONTACTS: Code 121—Silver Cadmium Oxide gold flash, rated 15 amperes at 115 VAC or 32 VDC, non-inductive load.

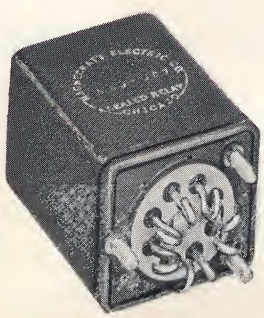
†volt. or current	res. ohms	nominal power	Stk. Part No. DPDT
alternating current voltage actuated			
6VAC 12VAC 24VAC 115VAC	— — — —	3 VA	W88ARX1 W88ARX2 W88ARX3 W88ARX4
direct current voltage actuated			
6VDC 12VDC 24VDC 110VDC	25 100 400 8000	1.5W	W88RX1 W88RX2 W88RX3 W88RX4

40-329 for 88D

Hermetically sealed (or dust proof) enclosure available with 88D 50-ampere power relay—single pole, single throw normally open contacts described above: 4-hook heavy duty solder terminal header.

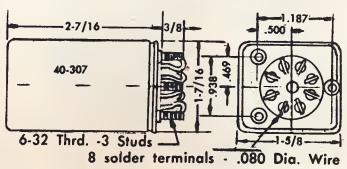


.050 dia. 52 alloy, 2 terminals
.093 dia., copper cored 52 alloy, 2 terminals



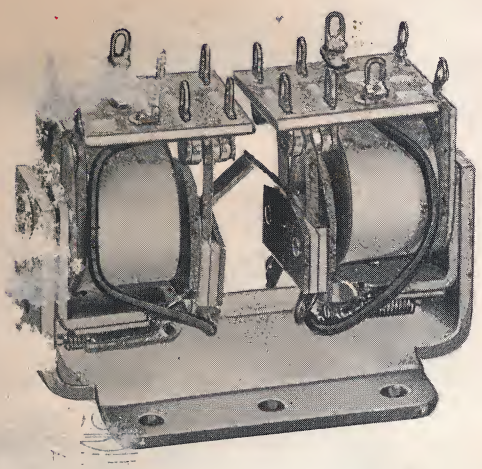
40-307 for 88R

Hermetically sealed (or dust proof) enclosure available with 88R Power Relay described above; contact combinations to DPDT. 8 hook, heavy duty, glass to metal, solder terminal header.



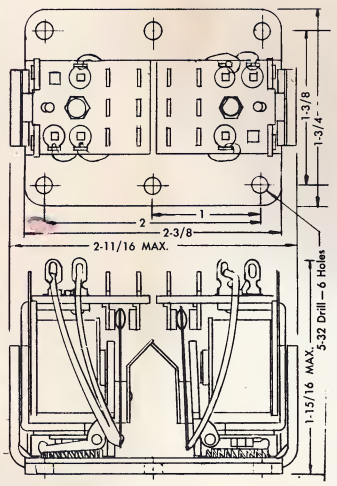
MAGNECRAFT ELECTRIC CO. 5575 N. Lynch Ave., Chicago, Ill. 60630

Class 88L AC and DC Latch-in Relays



Two high reliability Class 88 Relays (see page 6) mounted on a common base with armatures mechanically interlocked. Each armature latches when pulled in and the other armature resets (is released).

Aside from the interlocking mechanism each of the two relays is complete and independent. Each relay may be equipped with contact combinations up to 3PDT or a total of 6PDT for the two relays. The two relays can be furnished for operation from completely different voltages or currents.



When ordering or requesting quotation please specify for *each* relay (armature):

a. *Coil operating voltage or current.*

b. *Contact combination.*

Table G—Class 88L Relays—in stock for immediate shipment

CONTACTS: Code 120—Silver Cadmium Oxide gold flash, rated 10 amperes at 115 VAC or 32 VDC, non-inductive

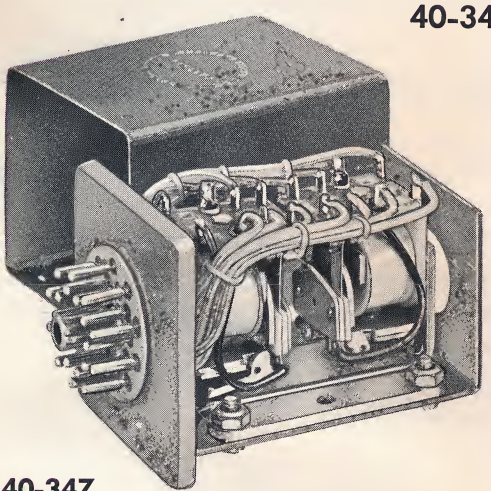
contact comb.	†voltage	res. ohms	nom. power	Stock Part No.
4PDT	6VAC	—	6VA prox.	W88ALX-2
	24VAC	—		W88ALX-3
	115VAC	—		W88ALX-4
6PDT	6VAC	—	6VA prox.	W88ALX-5
	24VAC	—		W88ALX-6
	115VAC	—		W88ALX-7
4PDT	6VDC	12	3W	W88LX-1
	12VDC	50		W88LX-2
	24VDC	200		W88LX-3
	110VDC	400		W88LX-4
6PDT	6VDC	12	3W	W88LX-5
	12VDC	50		W88LX-6
	24VDC	200		W88LX-7
	110VDC	4000		W88LX-8

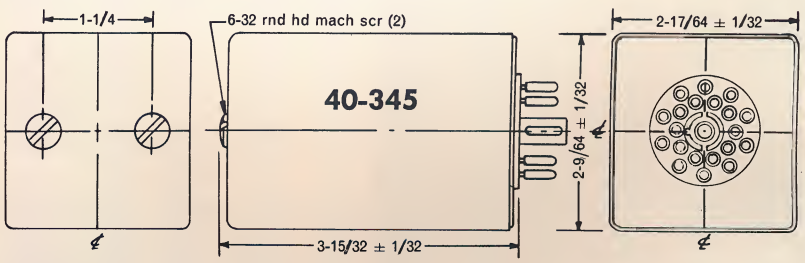
†Voltage operated relays pull in at 85% of nominal voltage

Send for
STOCK RELAY CATALOG
with latest prices.

40-345 Removable Dust Cover for Class 88L Latching Relays

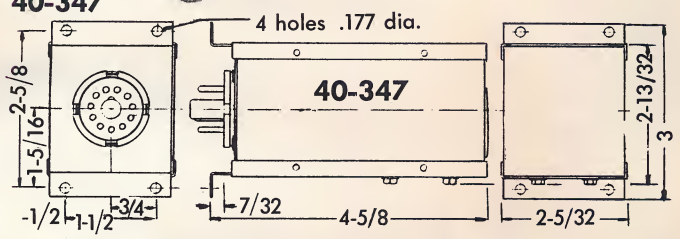
Class 88L Relay is also available with cover No. 40-345 hermetically sealed.





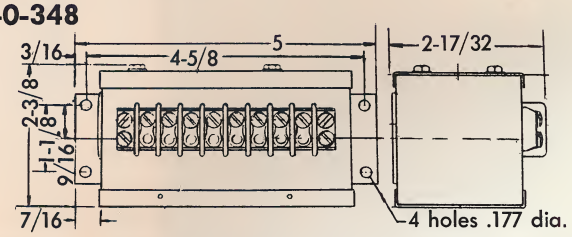
88L Latch-in Relay with hermetically sealed or dust tight enclosure with removable cover—octal type plug-in header.

40-347



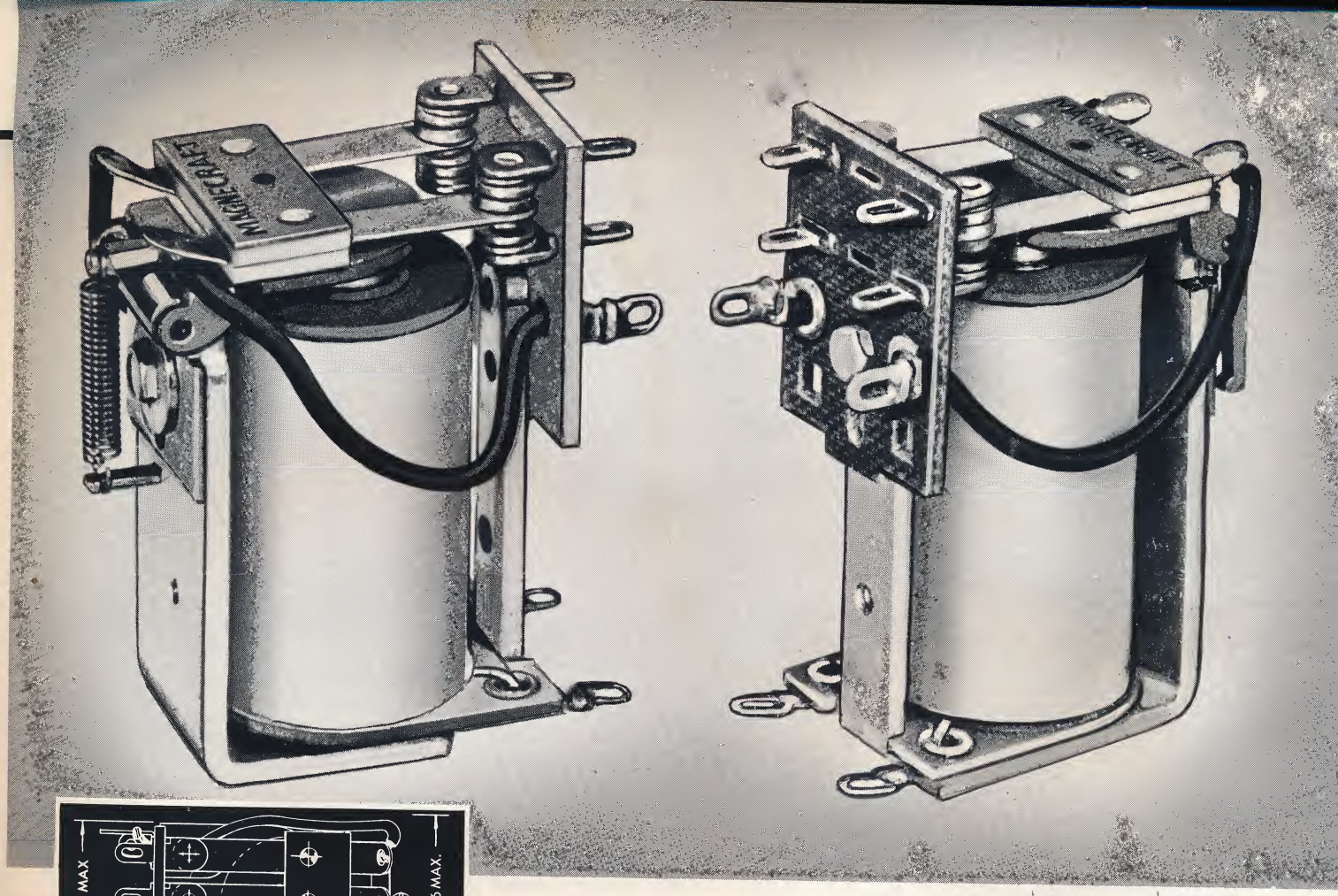
88L Latch-in Relay with heavy duty metal enclosure No. 40-347 octal type phenolic plug-in base and snap-on cover.

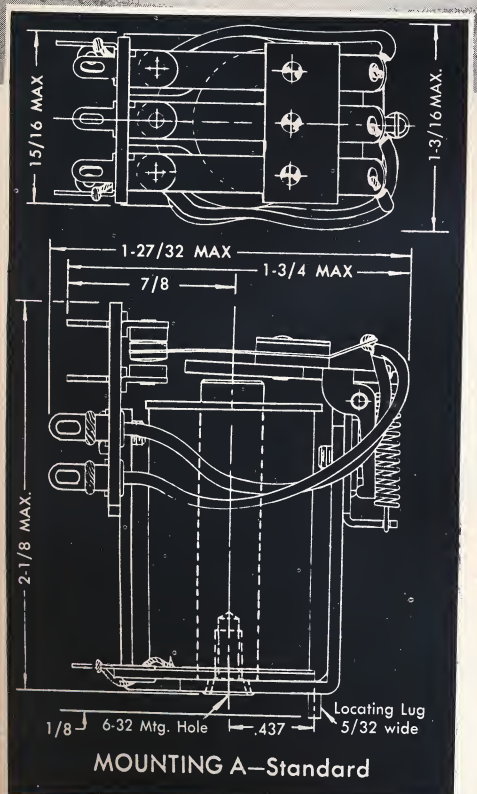
40-348



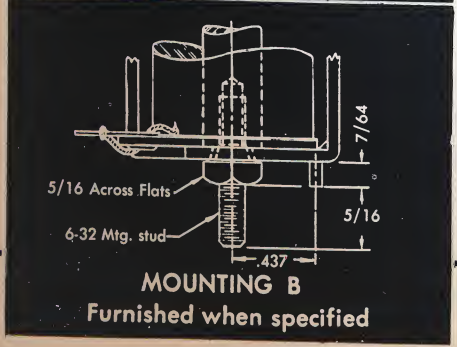
88L Latch-in Relay with heavy duty metal enclosure No. 40-348 molded phenolic barrier screw type terminals and snap-on cover.

SPECIAL RELAYS—MAGNECRAFT designs and builds Relays to meet special requirements. In case you do not find the relay you need just send the complete specifications you have to meet.





MOUNTING A—Standard



MOUNTING B
Furnished when specified

The Sensitive General Purpose Relay

Class 87 MAGNECRAFT Relays have the same unique quality construction as Class 88 General Purpose Relays (see page 6) plus greatly enlarged coil space.

The increased coil space makes possible these advantages:

1. High contact pressure with low operating wattage. See chart below.
2. Great coil power for reliable switching with great sensitivity.
3. Space for long slugs, permitting the unusual combination of fast operate time with slow release time (See 87S on opposite page).

The high-reliability design features include:

- Rugged, pin-type armature hinge with centerless ground stainless steel pin and heavy duty yoke with precision reamed bearing surfaces for low friction through long life.
- Glass insulation for great dielectric strength unaffected by humidity and temperature changes.
- Built-in contact wipe with riveted contacts.

Class 87—Sensitivity—Operate and Release Time

	SPDT	DPDT	3PDT
Min. Operate MW (sensitivity)	80	160	240
Operate Time — MS maximum	20.0	22.0	26.0
Release Time — MS maximum	30.0	28.0	26.0

COIL DATA

1. Standard Operating Currents are listed in Table A. Available for intermediate currents or voltages.
2. Standard Coil Resistances are listed in Table 7. Lower and higher resistances are available.
3. Operating Sensitivity is approximately 75MW per pole with 5 ampere contact rating. Relays for switching up to 10 amperes with greater coil operating power are available. Relays of increased operating sensitivity can be furnished to switch reduced contact loads.
4. Insulation to ground tested at 750 V. A.C., RMS, standard.
5. Terminals—solder type standard.

CONTACTS

1. Code 120: silver cadmium oxide gold flash, .187 dia. x .046 thick, rated 10 amperes (dependent on coil power) at 115 VAC or 32 VDC non-inductive load is standard. (See item three under "Coil Data" above.)

   Code 121: Silver Cadmium Oxide Gold flash, .205 dia. x .050 thick, rated 15 amperes* (see 88D, page 10).

   Code 122: Silver Cadmium Oxide Gold flash,. 250 dia. x .050 rated 50 amperes* when used in DOUBLE BREAK CONTACTS (see 88D, page 10).
2. Standard contact arrangements; SPDT DPDT and 3PDT.
3. Standard insulation—fiber glass melamine—tested at 750 volts A.C., RMS, for breakdown to ground.

   *at 115 VAC or 32 VDC, non-inductive load.

Table A-Class 87standard models

CONTACTS. Code 120 — Silver Cadmium Oxide rated 10 amperes at 115 VAC or 32 VDC, non-inductive load.

DC current	res. *ohms	contact comb.	Catalog Number
5.6MA	2500	SPDT	87X21
4.2MA	4500	SPDT	87X22
3.0MA	9000	SPDT	87X23
8.0MA	2500	DPDT	87X24
6.2MA	4500	DPDT	87X25
4.3MA	9000	DPDT	87X26

* Plus or minus 10% at +25°C

No. 16-229 Mounting Bracket for 87, 88, 88R and 88D Relays

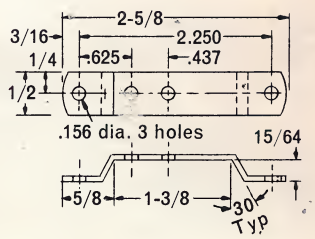
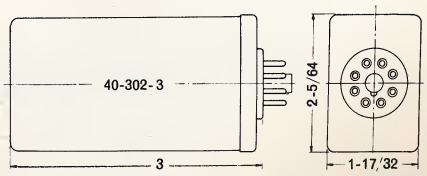


Table 7 — Class 87 Standard Coil Data Chart and Minimum Sensitivity Adjustment Values

Wire	Turns	*Ohms	Oper. MADC SPDT	Oper. MADC DPDT	Oper. MADC 3PDT	Wire	Turns	Ohms*	Operate MADC SPDT	Operate MADC DPDT	Operate MADC 3PDT
27	1150	8	100	140	170	36	8050	500	12.5	18.5	21.5
28	1350	12	80	115	140	37	14000	1200	8	12	13.5
29	1750	18	65	95	115	38	14500	1500	7.5	10.5	12.5
30	2600	40	45	62	73	39	18500	2500	5.6	8	9.5
31	3000	65	35	52	54	40	26000	4500	4.2	6.2	7
32	4000	100	28	42	47	41	31000	6000	3.6	5.3	6.1
33	4300	150	23	34	39	42	34000	9000	3	4.3	5
34	5800	250	18	26	30	43	40000	14000	2.4	3.3	4
35	6500	325	16	23	26	44	50000	20000	2	2.8	3.3

*Plus or minus 10% at +25° C.

40-302-3

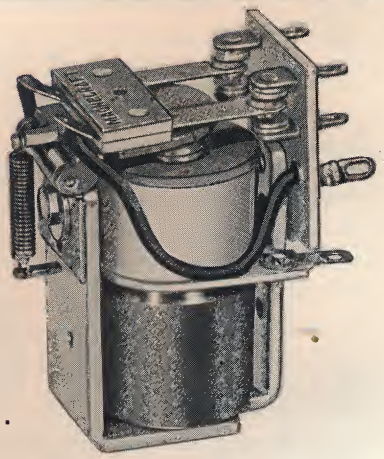


40-302-3 Enclosure—Available hermetically sealed or dust tight with Class 87 Relays, contact combinations to 3PDT. Heavy Duty Glass to Metal Octal Plug, 8-pin for SPDT and DPDT; 11-pin for 3PDT. Mates Amphenol Socket 77MIP-8 or -11 or equivalent. Class 87 Relays available with other enclosures.

CLASS 87S TIME DELAY RELAY—DC ONLY

The Class 87S Relay is a Class 87 Relay in which a portion of the coil space at the heel end of the coil is occupied by a copper slug. The slug causes delay in any change of flux in the magnetic circuit of the relay.

The unique design of the 87S Relay provides the unusual combination of fast operate time (30ms. prox.) with slow release time.



†Release Delay milliseconds, max.

DC Coil Operating voltages, 6, 12, 24, 110.

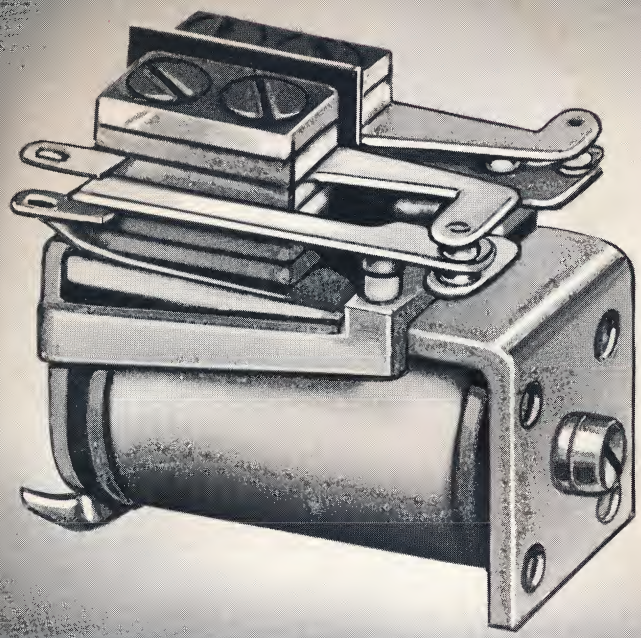
SPDT, 180 ms	DPDT, 150 ms	3PDT, 120 ms

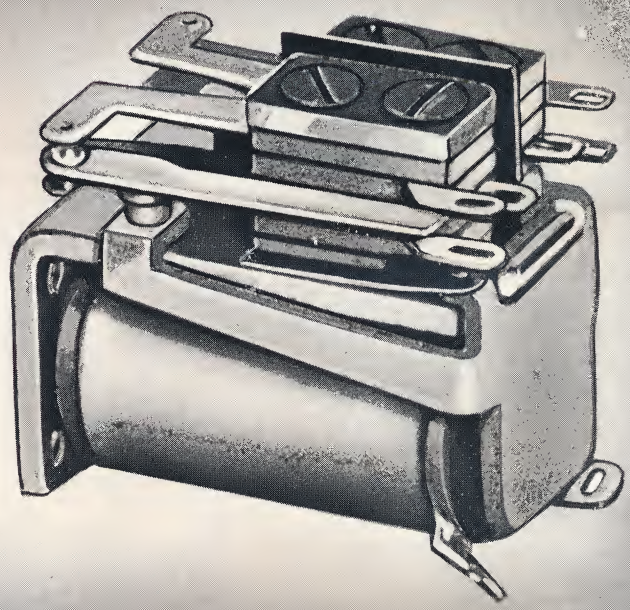
†Based on relay with 13/16" long copper slug at the heel end of the coil and a minimum coil wattage of 4 watts.

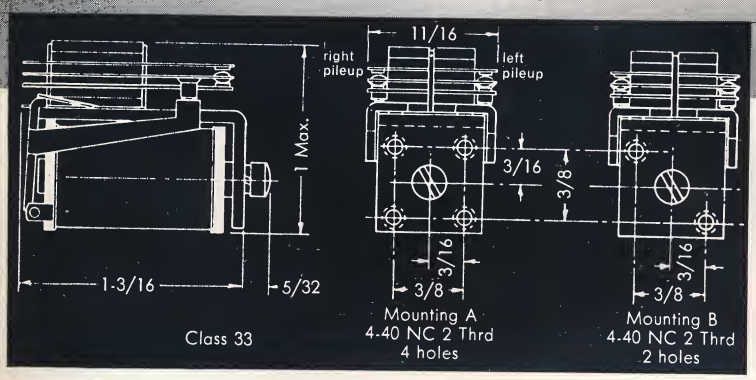
All the above data is based on the use of regulated voltage supply.

Standard Coil Data—87S with 13/16" Copper Slug

Wire	Turns	Ohms*	Wire	Turns	Ohms*	Wire	Turns	Ohms*	Wire	Turns	Ohms*
28	600	6	33	1800	50	33	5460	480	42	15200	4000
29	650	9	34	2400	100	39	7600	1000	43	16500	5000
30	760	12	35	2800	150	40	10000	2000	44	21000	8000
31	1000	25	36	3214	200	41	12000	2500	44	24000	10000
32	1400	49	37	5100	400	*Plus or minus 10% at + 25° C.					







The Subminiature Telephone Type Relay

Class 33 Variations

Send for
STOCK RELAY CATALOG
with latest prices.

Class 33 MAGNECRAFT Relays have been developed to provide maximum telephone type relay reliability in minimum space.

Class 33 Relays also afford extremely fast operate and release time (see table below and comparison chart on page 2).

Exceptional resistance to shock, vibration and temperature change are other features in which Class 33 Relays excel (see "Relays in compliance with Military Specifications", page 17).

Class 33 Relays have a well proportioned magnetic structure and precision detailed construction which maintains reliability despite the small size. Within the recommended range of application Class 33 Relays may be used with utmost confidence.

Class 33 Relays are made for DC operation and can be furnished with built-in rectification for operation from AC service (see "Reliable Operation from 400 CPS" page 16).

Class 33—Sensitivity—Operate and Release Time

	SPDT	DPDT	3PDT	4PDT
Min. Operate MW (sensitivity)	250	500	800	1100
Operate Time — MS maximum	5.5	6.5	8.0	10.0
Release Time — MS maximum	3.0	3.0	2.5	2.0

COIL DATA

1. Standard operating voltages are listed in Table A. Available for intermediate voltages to 110 volts, D.C.
2. D.C. Power Requirements: Nominal, 2.0 watts; minimum, .2 watts; maximum for continuous duty, 3.0 watts.
3. D.C. Resistance Range, .12 to 6500 ohms.
4. Insulation to ground tested at 750 volts, A.C., RMS, standard.
5. Terminals—solder type, (standard) or wire leads.

CONTACTS

1. Code 104: Paladium, .075 dia. x .020 thick, rated 3 amperes*

   Code 105: Silver Cadmium Oxide, .125 dia. x .020 thick, rated 5 amperes*

   Code 108: #1 Gold Alloy, .062 x .020 thick, for low level signal circuits.
2. Standard contact arrangements (see page 4). Available for DC with up to 6 contact arms per stack (12 arms total). See Enclosure 40-281 page 16, for rectified relay with contact combinations up to 4PDT, available for AC frequencies from 50 to 400CPS
3. Standard insulation—fiber glass melamine—tested at 750 volts A.C., RMS, for breakdown to ground.

*at 115 VAC or 32 VDC, non-inductive load.

Table A—Class 33 Relays—in stock for immediate shipment

CONTACTS: Code 104—Palladium, rated 3 amperes at 115 VAC or 32 VDC, non-inductive load.

contact comb.	†voltage	res. ohms	nom. power	Stock Part No.
DPDT	6VDC	17	2.0W	W33X237
	12VDC	75		W33X238
	24VDC	280		W33X239
	110VDC	6500		W33X240
4DPT	6VDC	17	2.0W	W33X241
	12VDC	75		W33X242
	24VDC	280		W33X243
	110VDC	6500		W33X244

ORDERING INFORMATION

Order STOCK or STANDARD Relays by Catalog (Part) Number.

When ordering or requesting information about special relays please specify:

1. Type (Magnecraft Class No.) with type and number of enclosure if desired.
2. Operating Coil Voltage or Current—AC or DC.
3. Contact Combination required.
4. Contact load in volts and amperes.
5. Type of load—inductive, non-inductive, motor, lamp, heater, etc.

Table 3—Class 33 Standard Coil Data Chart

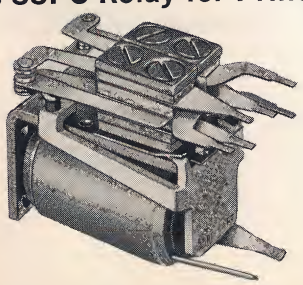
Wire	Turns	Ohms*	Wire	Turns	Ohms*	Wire	Turns	Ohms*
29	800	7	35	3000	100	41	12500	1800
30	1000	12	36	4200	200	42	14200	2400
31	1200	17	37	5000	280	43	20000	5000
32	1600	28	38	6600	500	44	22500	6500
33	2000	47	39	9000	800	—	—	—
34	2686	75	40	10500	1300	—	—	—

*Plus or minus 10% at +25° C.

Send for STOCK RELAY CATALOG with latest prices.

SPECIAL RELAYS—MAGNECRAFT designs and builds Relays to meet special requirements. In case you do not find the relay you need just send the complete specifications you have to meet.

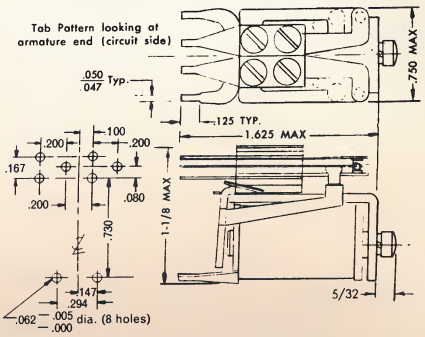
Class 33PC Relay for Printed Circuit Applications



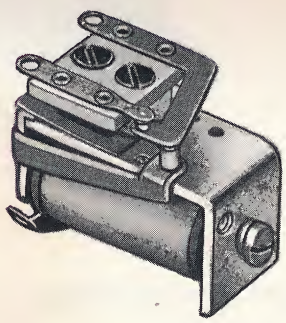
Equipped with special terminals to provide positive contact connections with fast assembly in printed circuit boards.

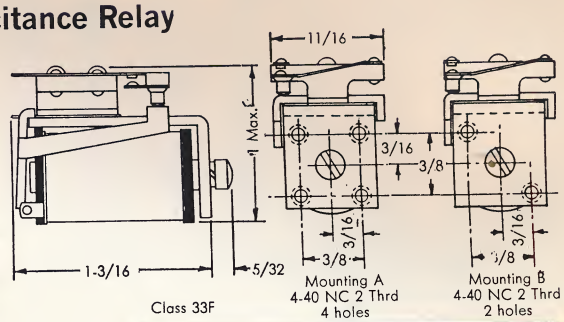
Available for DC operation with standard contact combinations to 6 arms per stack, 12 arms total.

Tab Pattern looking at armature end (circuit side)



Class 33F Low Capacitance Relay





For antenna switching. Equipped with special contact spring construction to afford lowest possible capacitance between springs.

Contact spring insulation of low loss ceramic. Available with Form A, B or C contact combinations. (see page 2)

Table B—Class 33F Relays—in stock for immediate shipment

CONTACTS: Palladium, rated 2 amperes at 115 VAC or 32 VDC, non-inductive load.

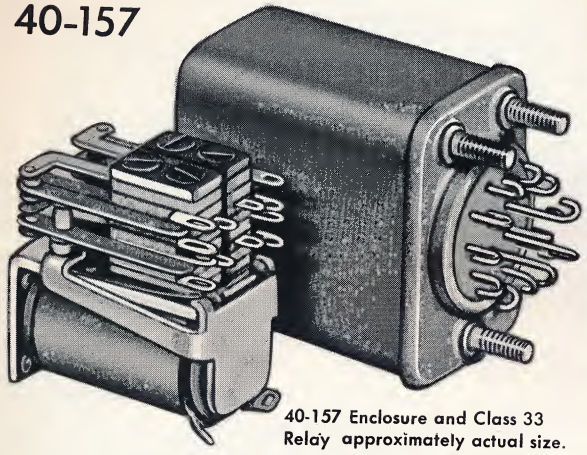
contact comb.	†voltage	res. ohms	nom. power	Stock Part No.
	direct current voltage actuated			
SPDT	6VDC	28	1.5W	W33FX20
	12VDC	100		W33FX21
	24VDC	500		W33FX22
	110VDC	6500		W33FX23

†Voltage operated relays pull in at 85% of nominal voltage

Hermetically Sealed (or dust tight) Enclosures for Class 33 Relays

Other enclosures available—send for special enclosure bulletin

40-157



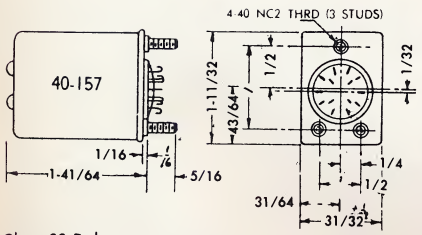
40-157 Enclosure and Class 33 Relay approximately actual size.

Reliable Operation from 400 CPS

Class 33 Relays with built-in rectification for reliable operation from AC can also be furnished in these enclosures. Advantages over conventional AC relay operation include: • Greater operating sensitivity. • Higher contact pressure. • Greater resistance to vibration. • Reliable operation through greater variations in voltage or current. • Elimination of AC hum. • Smaller size.

Rectified Relays are available for AC frequencies from 50 to 400 CPS.

Send for STOCK RELAY CATALOG with latest prices.



Class 33 Relay — 6 springs per stack total 12 springs. 8- or 14-pin Solder Terminal Header

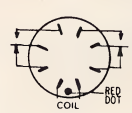
See Table C for above relays in stock

Table C—Class 33HS Relays—in stock for immediate shipment

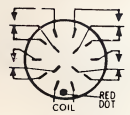
CONTACTS: Code 105, Silver Cadmium Oxide, rated 5 amperes at 115 VAC or 32 VDC, non-inductive load. 40-157 Enclosure

contact comb.	†voltage	res. ohms	nom. power	Stock Part No.
DPDT †WD-8	6VDC	17	2.0W	W33HSX177
	12VDC	75		W33HSX178
	24VDC	280		W33HSX179
	110VDC	6500		W33HSX180
4PDT WD-9	6VDC	17	2.0W	W33HSX181
	12VDC	75		W33HSX182
	24VDC	280		W33HSX183
	110VDC	6500		W33HSX184

†Voltage operated relays pull in at 85% of nominal voltage

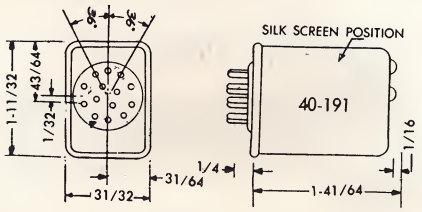


†WD-8 DPDT, 8-hook



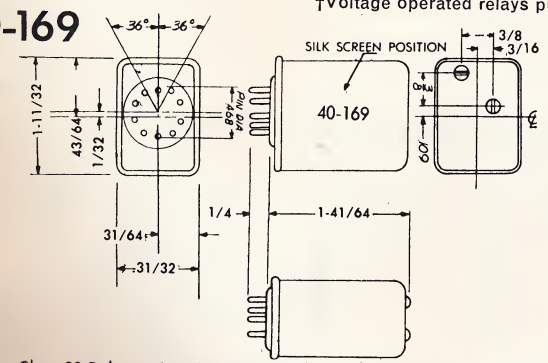
WD-9 4PDT, 14-hook

40-191



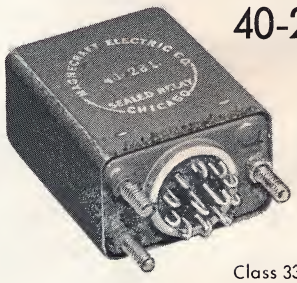
Class 33 Relay — 6 springs per stack, total 12 springs. 14-pin Miniature Plug. Mates with Cinch #54A14775, #54A16640 or equiv.

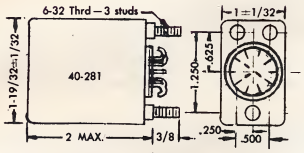
40-169



Class 33 Relay — 6 springs per stack, total 12 springs. 9-pin Miniature Plug. Mates with Elco Socket #555 BC or equiv.

40-281

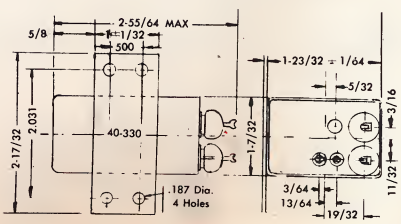




Class 33 Relay — 6 springs per stack total 12 springs. 8- or 14-pin Solder Terminal Header

Subminiature High Voltage Switching Hermetically Sealed Relays

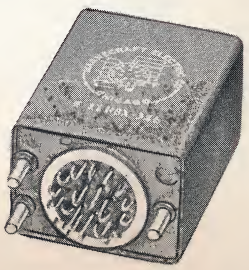
Available with Class 33 Relay contact combination single pole, single throw, normally open, double break. Capable of switching up to 2500 VAC RMS. Has four individual glass to metal solder type terminals.



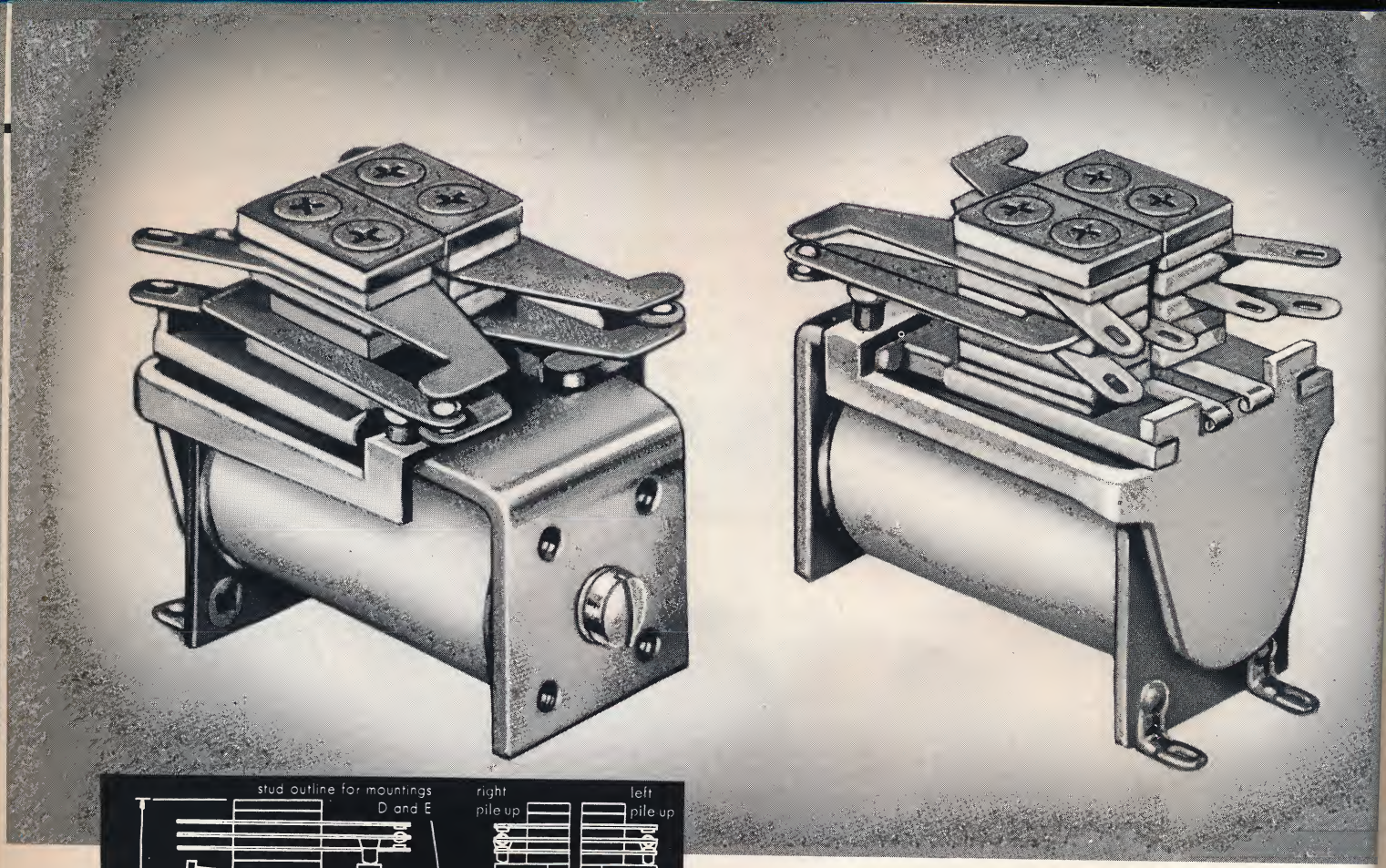
Relays to meet Exacting Military Specifications

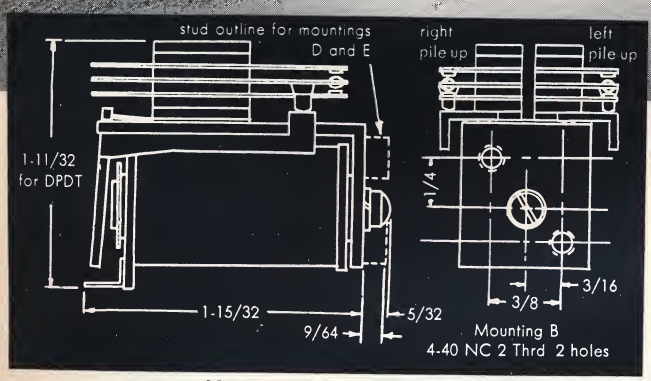
A wide selection of MAGNECRAFT High Reliability Relays is available to meet or exceed the typical requirements of such specifications as the latest revisions of MIL-R-5757 and MIL-R-6106, as well as many of the environmental specifications of MIL-E-5272 and the testing methods of MIL-STD-202.

Presented below are examples of essentially standard MAGNECRAFT Relays with characteristics ideally suited to Military applications. These and other types are capable of extensive modification to meet exacting requirements.

				
CLASS Enclosure	44HS 40-234	33HS 40-157	11HS 40-102	11HS 40-188
	All enclosures are hermetically sealed in inert gas			
TYPE	Balanced Rotary Armature Crystal Can	Sub-Miniature Telephone	Miniature Telephone	Miniature Telephone
CONTACTS Combination Rating	DPDT 2 amperes	4PDT 5 amperes	4PDT 5 amperes	6PDT 5 amperes
	All contact ratings at 115VAC or 28VDC, non-inductive			
Life at rated load	100,000 min.	100,000 min.	100,000 min.	100,000 min.
COIL Voltage Resistance	6 to 115VDC 22 to 5000 ohms	6 to 115VDC 7 to 6500 ohms	6 to 150VDC 13 to 14500 ohms	6 to 150VDC 13 to 14500 ohms
Operate Time	5 milliseconds max.	10 milliseconds max.	20 milliseconds max.	25 milliseconds max.
Release Time	5 milliseconds max.	2 milliseconds max.	3 milliseconds max.	3 milliseconds max.
VIBRATION	10-55CPS, 10G 55-2000CPS, 20G	10-500CPS, 10G	10-55CPS, 10G	10-55CPS, 10G
SHOCK	50G, 11MS	50G, 11MS	30G, 11MS	30G, 11MS
TEMPERATURE	—65° to 125°C	—55° to 85°C	—55° to 85°C	—55° to 85°C
WEIGHT, approx.	0.5 ounces	3 ounces	5 ounces	7 ounces
Dimensional Dia.	page 48	page 16	page 20	page 20
Basic Description	page 48	page 14	page 18	page 18

MAGNECRAFT Engineers have developed a great variety of relays to meet specific military requirements. These developments as well as many basic MAGNECRAFT Relay designs can be modified to meet varied specifications. For prompt cooperation please send us the specifications you need to meet.





Mounting B is Standard

The Miniature Telephone Type Relay

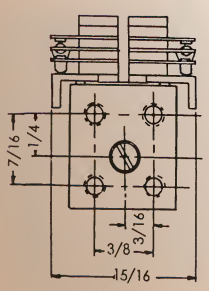
Class 11 MAGNECRAFT Relays have been developed to provide, in miniature size, ACCURACY, DURABILITY and ADAPTABILITY equal to and in some cases superior to the standards of larger telephone type relays.

These great qualities are achieved through a properly proportioned magnetic structure, more efficient iron to iron hinge and efficient coil construction that assures maximum switching performance with minimum power input.

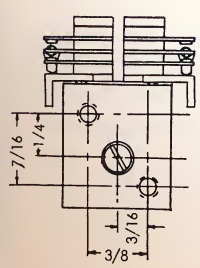
Class 11 Relays are available to meet military specifications for shock and vibration resistance also to withstand temperature variations (see "Relays in compliance with Military Specifications", page 17).

Class 11 Relays are made for DC operation and can be furnished with built-in rectification for operation from AC service (see "Reliable Operation from AC", page 20).

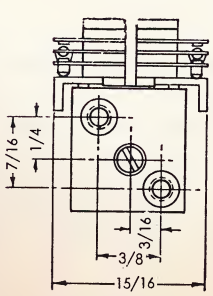
Class 11 Relay Variations



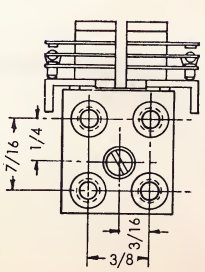
MOUNTING "A"
4 NO. 4-40 TAPPED HOLES



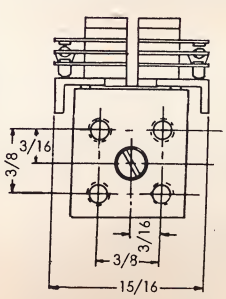
MOUNTING "B"
2 NO. 4-40 TAPPED HOLES



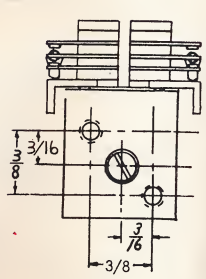
MOUNTING "D"
2 NO. 4-40 THRD. STUDS



MOUNTING "E"
4 NO. 4-40 THRD. STUDS



MOUNTING "F"
4 NO. 4-40 TAPPED HOLES



MOUNTING "G"
2 NO. 4-40 TAPPED HOLES

COIL DATA

1. Standard operating voltages are listed in Table 1. Available for intermediate and higher voltages to 150 volts, D.C.
2. D.C. power requirement—Nominal, 1.44 watts; min., .2 watts; max. 3.0 watts.
3. Resistance range—.12 to 14,500 ohms.
4. Insulation to ground tested at 750 volts A.C., RMS, standard.
5. Terminals—solder type or wire leads.

CONTACTS

1. Code 104: Paladium, .075 dia. x .020 thick, rated 3 amperes*

   Code 105: Silver Cadmium Oxide, .125 dia. x .020 thick, rated 5 amperes*

   Code 108: #1 Gold Alloy, .062 x .020 thick, for low level signal circuits.
2. Standard contact arrangements (see page 4). Available for DC with 8 contact arms per stack (16 arms total). For rectified Class 11 Relays for AC frequencies from 50 to 400CPS, see page 20.
3. Standard insulation—fiber glass melamine—tested at 750 volts A.C., RMS, for breakdown to ground.

   *at 115 VAC or 32 VDC, non-inductive load.

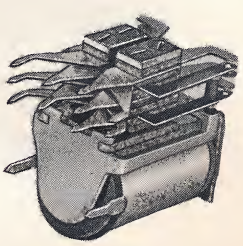
Table A–Class 11 standard models

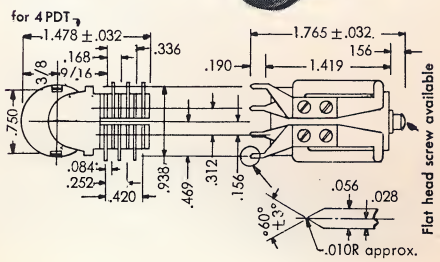
CONTACTS: Code 105, Silver Cadmium Oxide, rated 5 amperes at 115 VAC or 32 VDC, non-inductive load.

contact comb.	†voltage	res. ohms	nom. power	Catalog Number
4PDT	6VDC	25	1.5W	11X505
	12VDC	100		11X506
	24VDC	400		11X507
	115VDC	9000		11X508
6PDT	6VDC	13	2.5W	11X509
	12VDC	56		11X510
	24VDC	280		11X511
	115VDC	5000		11X512
DC current actuated for plate circuit operation				
DPDT	5 MA	10000	250MW	11X513

†Voltage operated relays pull in at 85% of nominal voltage

Class 11 PC Relay for Printed Circuits





Class 11—Sensitivity—Operate and Release Time

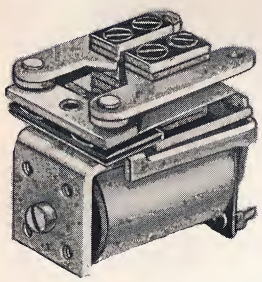
	SPDT	DPDT	3PDT	4PDT
Min. Operate MW (sensitivity)	150	300	500	700
Operate Time — MS maximum	11.5	12.5	14.5	19.0
Release Time — MS maximum	7.0	4.5	3.5	3.0

Table 1—Class 11 Standard Coil Data Chart

Wire	Turns	Ohms*	Wire	Turns	Ohms*	Wire	Turns	Ohms*
29	1280	13	35	5700	280	41	20500	3400
30	1750	25	36	7300	400	42	23250	5000
31	2200	40	37	8070	550	42	26000	6000
32	2600	56	38	10000	800	43	28000	9000
33	3360	100	39	14450	1585	44	32200	10000
34	4100	150	40	17750	2500	44	37500	14500

*Plus or minus 10% at +25°C

Class 11D 50-amp Power Relays—DC Operated



Miniature power relay of great sensitivity and reliability. Has Class 11 Coil Characteristics with special Heavy Duty Contacts. Available with single pole, single throw, normally open double break contacts. Contacts, Code 122: Silver Cadmium Oxide Gold flash, rated 50 amperes at 115 VAC or 32 VDC, non-inductive load. Available with quick disconnect terminals. See page 25.

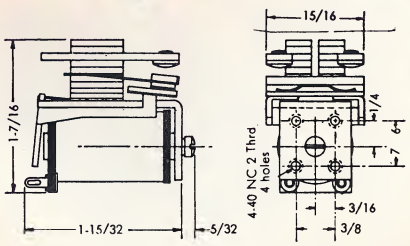


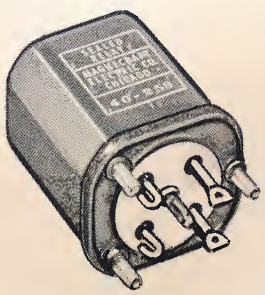
Table D—Class 11D Relays—in stock for immediate shipment

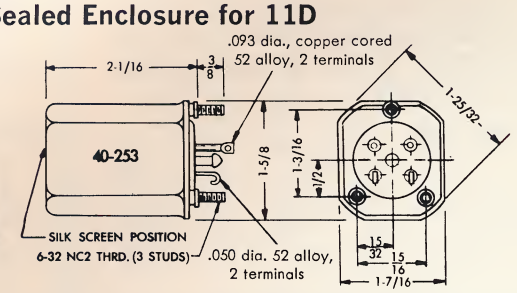
CONTACTS: Code 122—Silver Cadmium Oxide, DOUBLE BREAK, rated 50 amperes at 115 VAC or 32 VDC, non-inductive load.

contact comb.	†voltage	res. ohms	nom. power	Stock Part No.
direct current voltage actuated				
SPST NO double break	6VDC	25	1.5W	W11DX38
	12VDC	100		W11DX39
	24VDC	400		W11DX40
	110VDC	9000		W11DX41

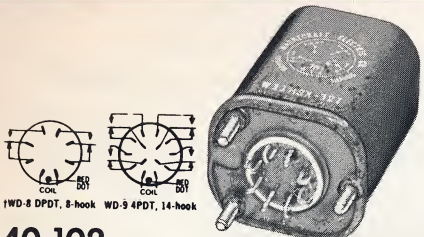
†Voltage operated relays pull in at 85% of nominal voltage

40-253-2 Hermetically Sealed Enclosure for 11D

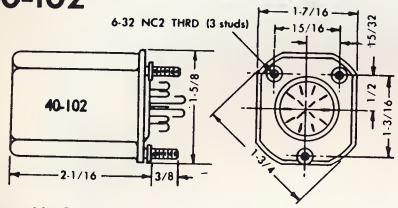




Hermetically sealed (or dust proof) enclosure available with 11D Power Relay described above.



40-102



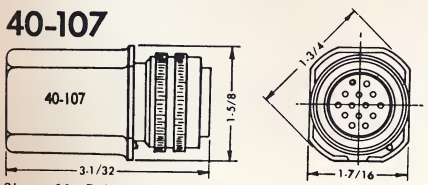
Class 11 Relay—6 springs per stack, total 12 springs. 8- or 14-pin solder terminal header.

Table B—Class 11HS Relays—in stock for immediate shipment

CONTACTS: Code 105—Silver Cadmium Oxide, rated 5 amperes at 115 VAC or 32 VDC, non-inductive load. 40-102 Enclosure

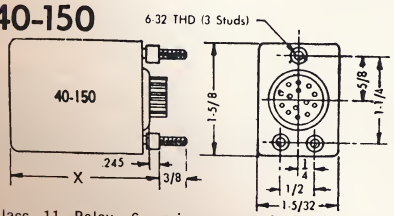
contact comb.	†voltage	res. ohms	nom. power	Stock Part No.
	direct current voltage actuated			
4PDT WD-9	6VDC	25	1.5W	W11HSX321
	12VDC	100		W11HSX322
	24VDC	400		W11HSX323
	110VDC	9000		W11HSX324
	DC current actuated for plate circuit operation			
DPDT WD-8	5 MA	10000	250 MW	W11HXS325

40-107



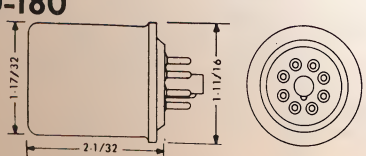
Class 11 Relay—6 springs per stack, total 12 springs. 8- or 14-pin screw lock plug. (AN connector).

40-150



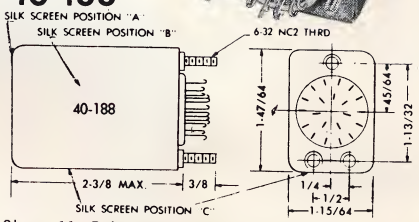
Class 11 Relay—6 springs per stack, total 12 springs. 14-pin miniature plug.
40-150-2: "X" is 2-3/32 max. based on 1/16 thk. chassis. Mates Cinch #54A14775 or equiv. (under chassis mounting)
40-150-3: "X" is 2-1/4 max. Mates Cinch #54A-16640 or equiv.

40-180



Class 11 Relay—4 springs per stack, total 8 springs. Octal plug. Mates MIP-8 Amphenol Socket or equiv.

40-188



Class 11 Relay—9 springs per stack, total 18 springs. 20-pin solder terminal header.

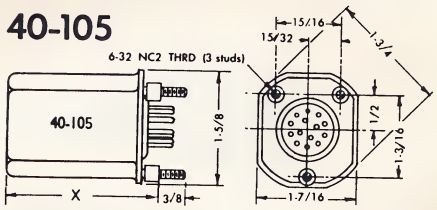
Table C—Class 11HS Relays—in stock for immediate shipment

CONTACTS: Code 105—Silver Cadmium Oxide, rated 5 amperes at 115 VAC or 32 VDC, non-inductive load. 40-188 Enclosure

contact comb.	†voltage	res. ohms	nom. power	Stock Part No.
	direct current voltage actuated			
6PDT WD-10	6VDC	13	2.5W	W11HSX326
	12VDC	56		W11HSX327
	24VDC	280		W11HSX328
	110VDC	5000		W11HSX329

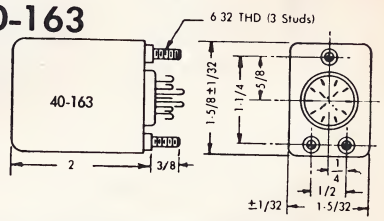
†Voltage operated relays pull in at 85% of nominal voltage

40-105



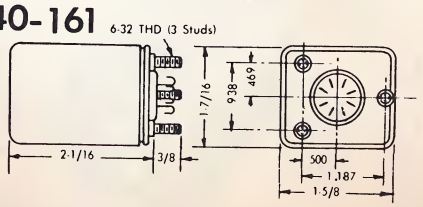
Class 11 Relay—6 springs per stack, total 12 springs. 14-pin miniature plug.
40-105-1: "X" is 2-7/32 max. based on 1/16 thk. chassis. Mates Cinch #54A14775 or equiv. (under chassis mounting).
40-105-5: "X" is 2-3/8 max. Mates Cinch #54A-16640 or equiv.

40-163



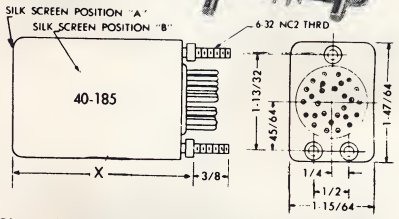
Class 11 Relay—6 springs per stack, total 12 springs. 8- or 14-pin solder terminal header.

40-161



Class 11 Relay—6 springs per stack, total 12 springs. 8- or 14-pin solder terminal header.

40-185

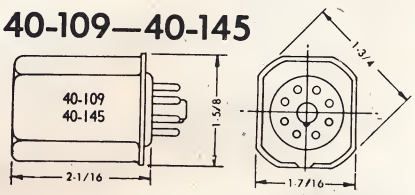


Class 11 Relay—9 springs per stack, total 18 springs. 20-pin miniature plug-in header.
40-185-1: "X" is 2-29/64 max. based on 1/16 thk. chassis. Mates Cinch #54A17686 or equiv. (under chassis mounting)
40-185-3: "X" is 2-37/64 max. Mates Cinch #54A-22106 or equiv.

Reliable Operation from AC

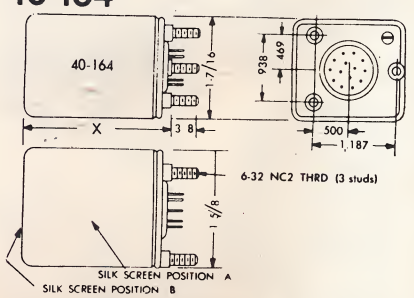
Class 11 Relays with built-in rectification for reliable operation from AC can also be furnished in these enclosures. Advantages over conventional AC operation include: • Higher Contact Pressures. • Increased Sensitivity. • Greater resistance to vibration. • Reliable operation through much wider variations in voltage and current. • Elimination of AC hum. *Available for AC frequencies from 50 to 400CPS.*

40-109—40-145



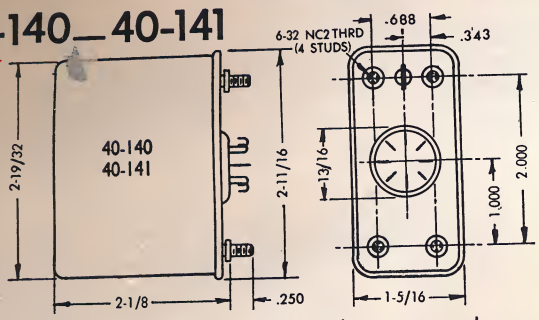
Class 11 Relay—6 springs per stack, total 12 springs.
40-109: Heavy Duty Glass to Metal Octal Plug. Mates MIP-8 Amphenol Socket or equiv.
40-145: Heavy Duty Glass to Metal 11-pin plug. Mates MIP-11 Amphenol Socket or equiv.

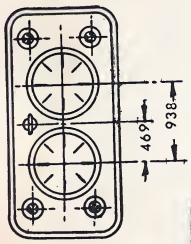
40-164

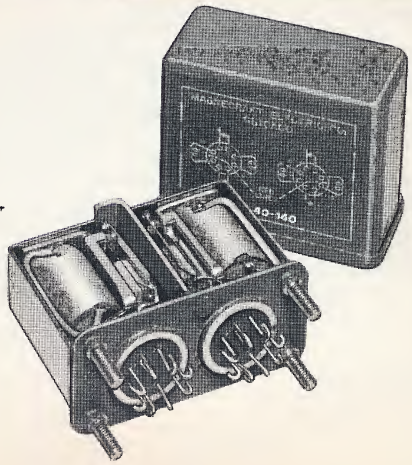


Class 11 Relay—6 springs per stack, total 12 springs total. 14-pin miniature plug.
40-164-2: "X" is 2-7/32 max. based on 1/16 thk. chassis. Mates Cinch #54A14775 or equiv. (under chassis mounting).
40-164-3: "X" is 2-3/8 max. Mates Cinch #54A-16640 or equiv.

40-140—40-141

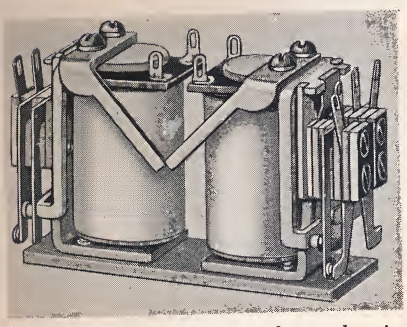






Available with two Class 11 Relays per enclosure with up to DPDT contact combinations per relay.

40-140—8-pin or 14-pin solder terminal header
40-141—two 8- or two 14-pin solder terminal headers.

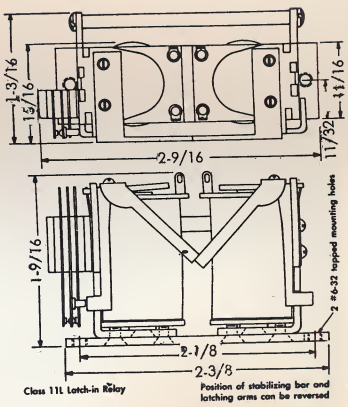


Class 11L Interlocking (latching) Relays

OPERATION: DC, continuous or intermittent; AC, intermittent

Two complete Class 11 Relays mounted on a common base with armatures mechanically interlocked. Each armature latches when pulled in. Energizing one armature resets (releases) the other.

The latching levers are alloy steel, heat treated and hard chrome plated for reliability and long wear.



IMPORTANT: Aside from the interlocking levers each relay is complete and independent. Both relays may be equipped with various contact combinations. The two relays can be furnished for different operating voltages or currents.

In ordering please *specify for each relay*

a. Coil operating voltage or current

b. Contact combination.

Table A: 11L Standard Relays

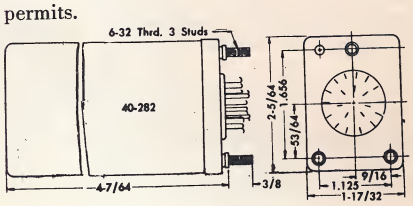
Cat. No.	contacts 5 amps.	†voltage	res. ohms	nominal power
11LX100	two DPDT	6VDC	13	2.7
11LX101		12VDC	56	2.7
11LX102		24VDC	280	2.0
11LX103		110VDC	5000	2.0

†Voltage operated relays pull in at 85% of nominal voltage

Class 11L Latching Relays with Hermetically Sealed (or dust tight) Enclosures

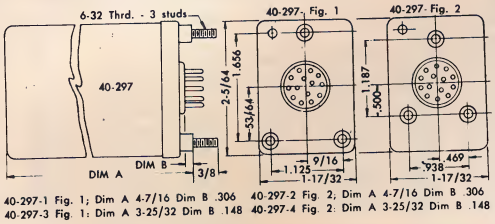
40-282 for 11L

Available with Class 11L Latch-in Relay. Contact combinations to DPDT on each relay (4 PDT total) with 20-hook solder terminal header; contact combinations to 4 PDT on each relay (8 PDT total) with 28-hook solder terminal header. Available with 8- or 14-hook header when circuitry permits.



40-297 for 11L

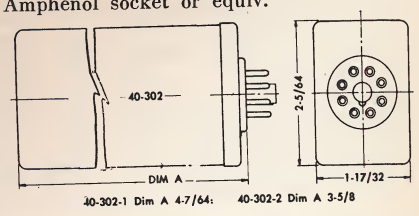
Available with Class 11L Latch-in Relay. Contact combinations to DPDT on each relay (4 PDT total) with 20-pin miniature plug-in header where circuitry permits.



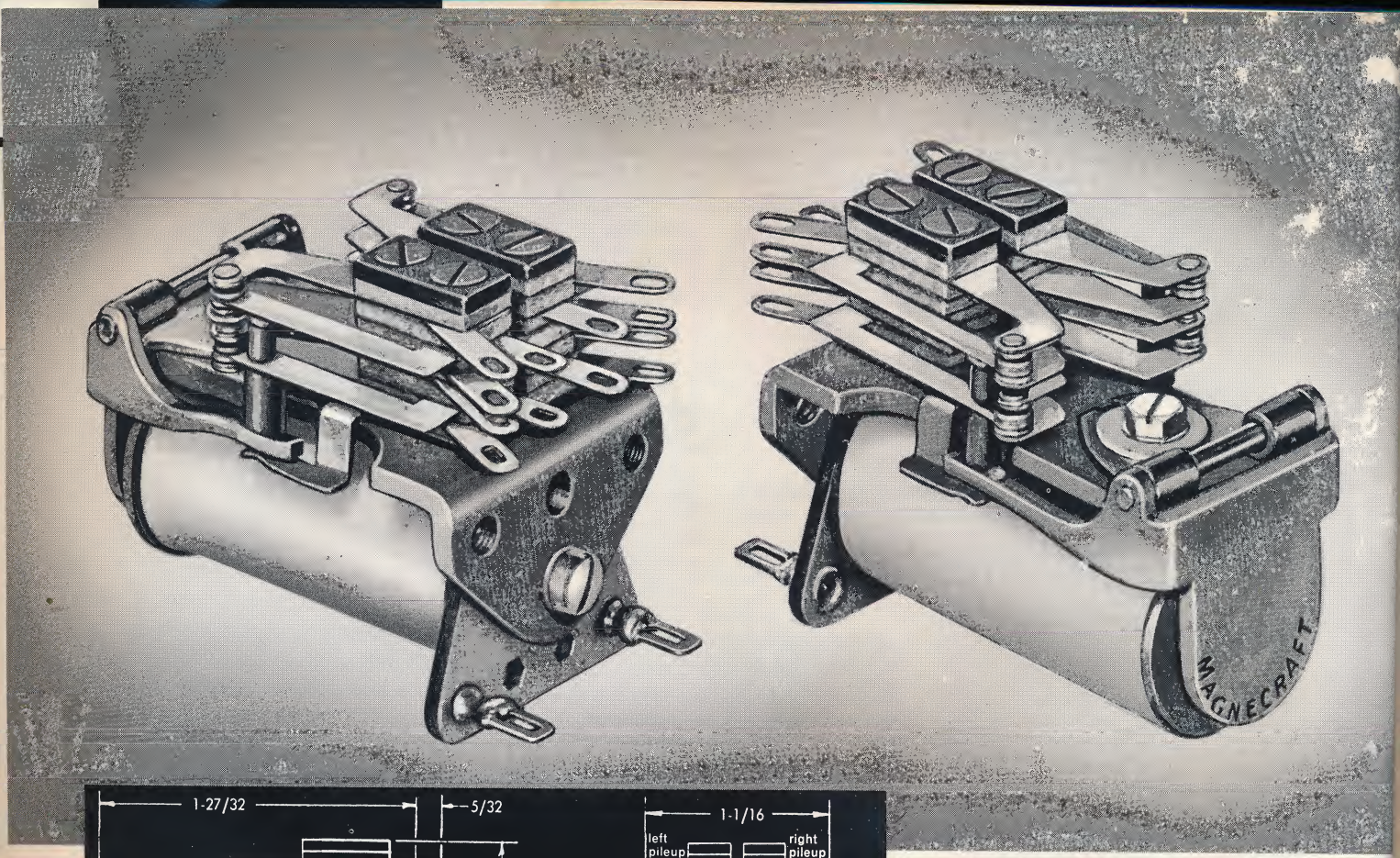
40-297-1 Fig. 1; Dim A 4-7/16 Dim B .306 40-297-2 Fig. 2, Dim A 4-7/16 Dim B .306
40-297-3 Fig. 1: Dim A 3-25/32 Dim B .148 40-297-4 Fig. 2: Dim A 3-25/32 Dim B .148

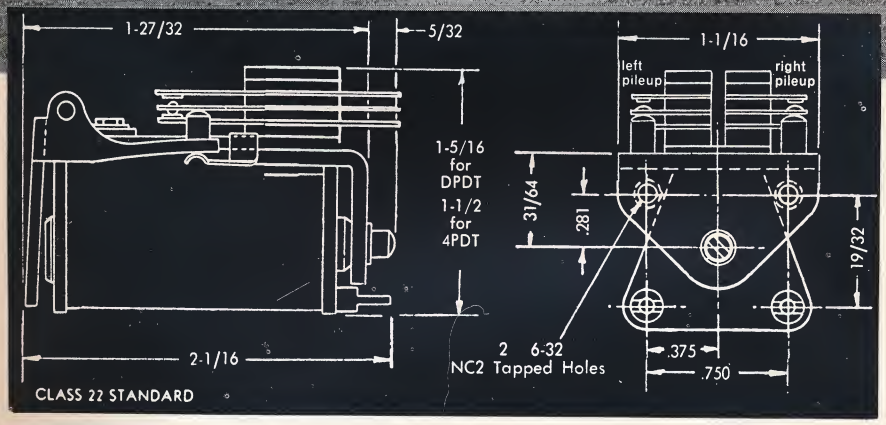
40-302 for 11L

Available with Class 11L Latch-in Relay. Contact combinations to DPDT on each relay (4 PDT total) with heavy duty glass to metal 20-pin octal style plug—mates MIP-20 Amphenol socket or equiv. Also available with 8- or 11-pin octal plug—mate with MIP-8 or MIP-11 standard Amphenol socket or equiv.



40-302-1 Dim A 4-7/64: 40-302-2 Dim A 3-5/8





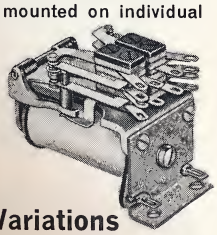
The Small Telephone Type Relay

Made for AC and DC Operation

MOUNTING

Coil and contact spring terminals are at mounting end—wiring can be concealed when Relay is mounted. Frame tapped for two No. 6-32 screws (not supplied). May be mounted on individual base or strip mounted.

No. 16-123, L-mounting Bracket with two No. 6-32 screws, available as shown at right.



Class 22 Relay Variations

Class 22 MAGNECRAFT Relays can be furnished to meet low wattage sensitive requirements, as well as requirements where a large number of switching functions must be performed by one relay with minimum power input.

Class 22 Relays are equipped with a unique pin-type armature hinge with centerless ground, stainless steel pin and heavy duty yoke with precision reamed oversize bearing surfaces. A heavy heel piece stabilizes contact adjustments. Wear resisting buffers are firmly attached to contact springs.

Class 22 Relays are available to meet military specifications for shock and vibration, also to withstand wide temperature variations.

Class 22—Sensitivity—Operate and Release Time

	SPDT	DPDT	3PDT	4PDT
Min. Operate MW (sensitivity)	100	200	320	450
Operate Time — MS maximum	9.5	11.5	12.5	16.0
Release Time — MS maximum	13.0	6.0	3.5	3.5

COIL DATA

1. Standard operating voltages are listed in Table 2. Available for intermediate and higher operating voltages up to 230 volts, D.C., and 230 volts, A.C. (60 cycle).
2. D.C. Power Requirements: Nominal, 2.5 watts; minimum, .1 watt; maximum for continuous duty, 4.3 watts.
3. A.C. nominal volt-ampere requirements, 5 V.A.
4. D.C. resistance range, .12 to 20,000 ohms.
5. Insulation to ground tested at 750 A.C., RMS, standard.
6. Terminals—solder type (standard) or wire leads.

CONTACTS

1. Code 104: Paladium, .075 dia. x .020 thick, rated 3 amperes*

   Code 105: Silver Cadmium Oxide, .125 dia. x .020 thick, rated 5 amperes*

   Code 108: #1 Gold Alloy, .062 x .020 thick, for low level signal circuits.

   Code 106: Bifurcated Palladium, .062 dia. x .020 thick, rated 4 amperes* (see 22T, page 24)

   Code 111: Bifurcated #1 Gold Alloy, .062″ x .020 thick, for low level signal circuits (see 22T, page 24).

   Code 109: Silver Cadmium Oxide, .187 dia. x .047, rated 10 amperes* (see 22R, page 25).

   Code 112: Silver Tungsten, .187 dia. x .050 thick, rated 12 amperes* (see 22R, page 25).

   Code 118: Silver Tungsten Carbide, .250 dia. x .050 thick, rated 15 amperes* (see 22R, page 25).
2. Standard contact arrangements (see page 2.) Available for D.C. with 12 contact arms per stack (24 arms per relay); for direct A.C. operation with 4 contact arms per stack (8 arms per relay); and rectified for AC frequencies from 50 to 400 CPS with up to 12 contact arms per stack (24 arms per relay)
3. Standard insulation—fiber glass melamine—tested at 750 volts A.C., RMS, for breakdown to ground.

   *at 115 VAC or 32 VDC, non-inductive load.

Table A—Class 22 Operating Data

Voltage	D.C.		60 CPS	
	D.C. Ohms	Wire Size	D.C. Ohms	Wire Size
6	12	28	2.0	24
12	50	31	5.0	26
24	225	34	20	29
48	900	37	120	33
115	5000	41	500	36
230	20000	44	2600	39

Table 2—Class 22 Standard Coil Data Chart

Wire	Turns	Ohms*	Wire	Turns	Ohms*	Wire	Turns	Ohms*
28	1420	12	35	7900	375	41	27700	5000
29	1700	20	36	9000	500	41	32000	6000
30	2800	40	37	13000	900	42	29000	8000
31	2930	50	38	13700	1300	43	36000	10000
32	3500	80	39	21900	2700	43	47000	14000
33	5800	170	40	25400	4000	44	53000	20000
34	7000	225	—	—	—	—	—	—

* Plus or minus 10% at +25°C

Suggestions for Ordering or Requesting Quotation

Order STOCK or STANDARD Relays by Catalog (Part) Number.

When ordering or requesting information about special relays please specify:

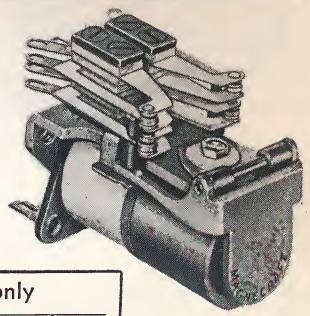
1. Type (Magnecraft Class No.) with type and number of enclosure if desired.
2. Operating Coil Voltage or Current—AC or DC.
3. Contact Combination required.
4. Contact load in volts and amperes.
5. Type of load—inductive, non-inductive, motor, lamp, heater, etc.

SPECIAL RELAYS—MAGNECRAFT designs and builds Relays to meet special requirements. In case you do not find the relay you need just send the complete specifications you have to meet.

Send for STOCK RELAY CATALOG with latest prices.

CLASS 22S TIME DELAY RELAY—DC ONLY

A Class 22 Relay in which a portion of the coil space is occupied by a copper slug. The slug causes a delay in any change of flux in the magnetic circuit of the relay. Position of the copper slug determines whether the relay has an "operate delay" or a "release delay" as shown in the notes below.



Contacts	Coil Operating Voltage—DC only							
	12	24	48	115	12	24	48	115
	*Operate Delay milliseconds				†Release Delay milliseconds max.			
SPDT	40	40	60	65	150	150	150	150
DPDT	50	50	60	65	100	100	100	100
3PDT	50	40	60	65	65	65	65	65
4PDT	50	40	60	70	45	45	45	45

*Based on a relay with ¾″ long copper slug at armature end of the coil; and which pulls in at 90% (or less) of the operating voltage at which the delay is measured.
†Based on a relay with ¾″ long copper slug at the heel end of the coil and a minimum coil wattage of 3 watts.
All the above data is based on the use of regulated supply voltage.

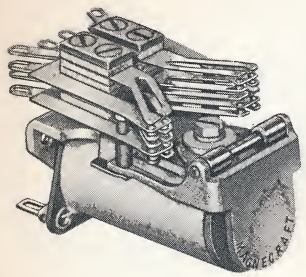
Standard Coil Data—22S with ¾″ Copper Slug

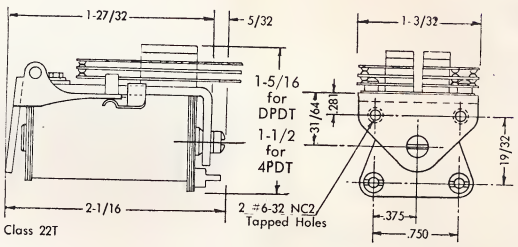
Applicable to either Operate or Release Time Delays

Wire	Ohms*	Wire	Ohms*	Wire	Ohms*	Wire	Ohms*	Wire	Ohms*	Wire	Ohms*
28	6.5	31	20	34	100	37	400	40	1800	43	5000
29	11.5	32	45	35	200	38	500	41	2500	44	8800
30	18	33	65	36	250	39	800	42	3500	45	13200

* Plus or minus 10% at +25°C

Class 22T Twin Contact (bifurcated) Relays





Has bifurcated (twin) contacts for reliable switching of extremely low voltage and low current.

Flexibility of the long, bifurcated contact springs enables the twin points to make contact independently, thus permitting one point to make contact even when the other is blocked by dust or grit. Contact combinations: DC operation to 6PDT; AC operation to DPDT.

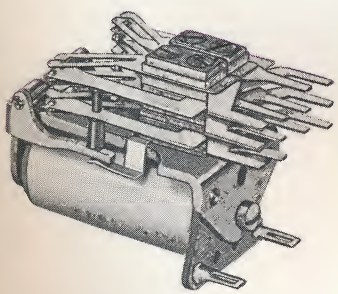
Table A—Class 22T Relays stock for immediate shipment

CONTACTS. Code 106—Bifurcated Palladium rated 4 amperes at 115 VAC or 32 VDC, non-inductive load.

contact comb.	†voltage	res. ohms	nom. power	Stock Part No.
alternating current voltage actuated				
DPDT	115VAC	500	5VA	W22ATX12
direct current voltage actuated				
4PDT	6VDC	20	2.0W	W22TX267
	12VDC	80	2.0W	W22TX268
	24VDC	375	1.5W	W22TX269
	110VDC	8000	1.5W	W22TX270
6PDT	6VDC	12	3.0W	W22TX271
	12VDC	50		W22TX272
	24VDC	225		W22TX273
	110VDC	5000		W22TX274
DC current actuated for plate circuit operation				
SPDT	4.5 MA	5000	100 MW	W22TX276
	6.0 MA	2700		W22TX277
	3.2 MA	10000		W22TX278
DPDT	4.5 MA	10000	200 MW	W22TX275

†Voltage operated relays pull in at 85% of nominal voltage

Taper Tab Solderless Terminals

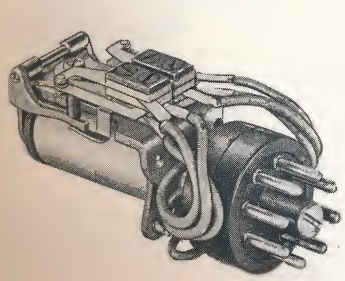


Class 22 Relay with Twin (bifurcated) Contacts and Taper Tab Terminals that mate with AMP Series 78 Taper Tab *Solderless* Terminals or equivalent. (22B designates 22 Relay with Taper Tab Terminals)

The Taper Tab Terminals speed assembly; also facilitate removal and replacement.

Taper Tab Terminals can be furnished —

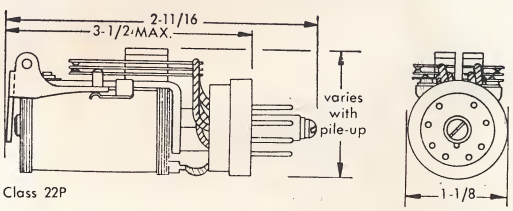
1. With Class 22 Relays; AC with contact combinations to 2PDT; DC, with contact combinations to 6PDT; Class 22T Twin Contacts; 22S Time Delay, and 22R Power Relays and 22SA Snap Action Relays.
2. With Class 11 Relays and Class 66 Relays in all standard forms. See page 18 for Class 11 Relays; page 30 for Class 66 Relays.

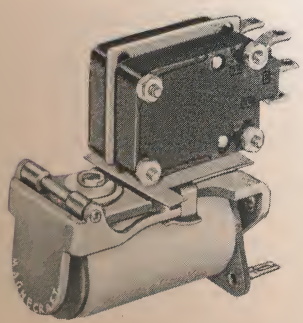


Class 22P Plug-In Relay

Class 22 Relay with 8-, 12- or 20-pin Octal Style Phenolic Plug.

Plug-in relays can be installed, or replaced without disturbing connections. In portable equipment, Plug-in relays can be removed readily for protection in transit.

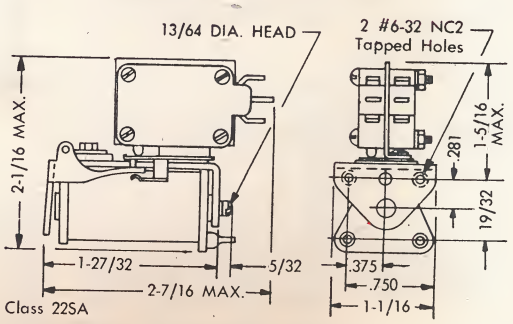


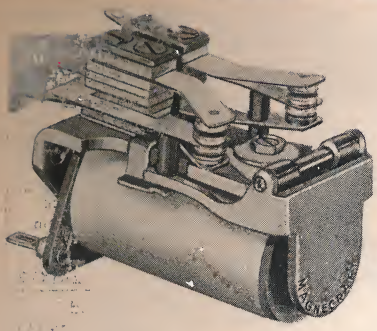


Class 22SA Snap Action Relay

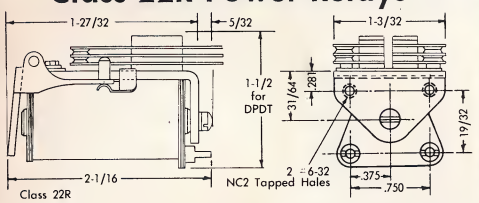
Class 22 Relay with snap action enclosed contacts. Available either with one snap switch having single pole, double throw contacts or with two snap switches affording double pole, double throw contacts.

Contact Rating: 10 amperes at 115 VAC, noninductive load. DC or AC operation.





Class 22R Power Relays



Has heavy duty contact arms and contacts with nominal rating of 10 amperes at 115 VAC or 32 VDC non-inductive load. Can be furnished in combinations with bifurcated contacts for switching both heavy loads and low level signal loads with the same relay.

Available with contact combinations up to four pole, double throw for DC operation and double pole, double throw for AC operation. **For Models in Stock see Table B**

Table B—Class 22R Relays—in stock for immediate shipment

CONTACTS. Code 109—Silver Cadmium Oxide rated 10 amperes at 115 VAC or 32 VDC, non-inductive load.

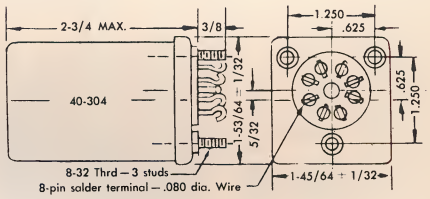
contact comb.	†voltage	res. ohms	nom. power	Stock Part No.
alternating current voltage actuated				
DPDT	6VAC	2.0	5VA	W22ARX38
	24VAC	20		W22ARX39
	115VAC	500		W22ARX40
direct current voltage actuated				
DPDT	6VDC	20	2.5W	W22RX67
	12VDC	88		W22RX68
	24VDC	225		W22RX69
	110VDC	5000		W22RX70
4PDT	6VDC	20	2.5W	W22RX71
	12VDC	80		W22RX72
	24VDC	225		W22RX73
	110VDC	5000		W22RX74

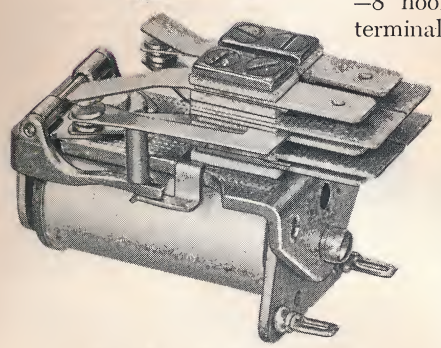
†Voltage operated relays pull in at 85% of nominal voltage

40-304

40-304 Enclosure for 22R

Hermetically Sealed or Dust Tight enclosure available with Class 22R Power Relay (described above); contact combinations to DPDT —8 hook heavy duty glass to metal solder terminal header.





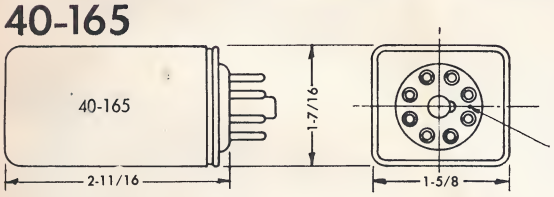
Quick Disconnect Terminals for Classes 22, 66 and 11D

Widely used for heavy duty industrial applications. Mate with AMP 250 Series Faston receptacles or equivalent. Available on Class 22R (illustrated) and 66R (page 32) to 2PDT with barrier strips between terminals; to 4PDT without barriers.

Also available on Class 11D with SPST, normally open, double break contacts, page 19.

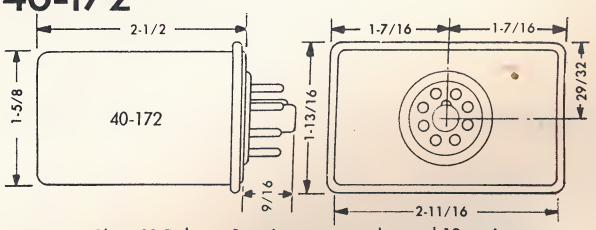
Class 22 Hermetically Sealed or Dust Tight Enclosures

40-165



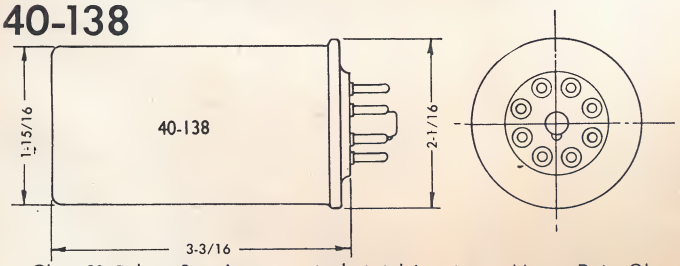
Class 22 Relay—6 springs per stack, total 12 springs. Heavy Duty glass to metal Octal Plug.
Mates with MIP-8 Amphenol Socket or equivalent.

40-172



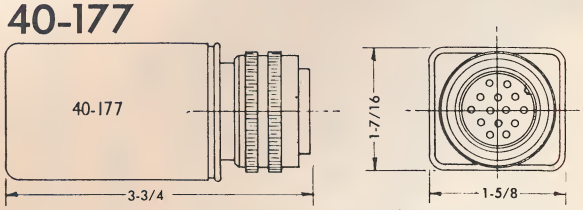
Class 22 Relay—9 springs per stack, total 18 springs. Heavy duty glass to metal octal plug. Mates with MIP-8 Amphenol Socket or equivalent.

40-138



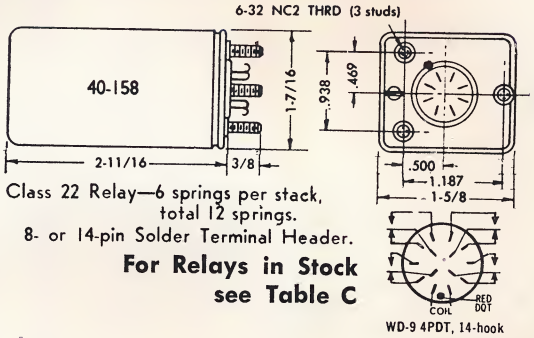
Class 22 Relay—3 springs per stack, total 6 springs. Heavy Duty Glass to Metal Octal Plug. Mates with MIP-8 Amphenol Socket or equiv. Available with observation window.

40-177



Class 22 Relay—6 springs per stack, total 12 springs. 8- or 14-pin Screw Lock Plug (AN Connector)

40-158 Hermetically Sealed Enclosure

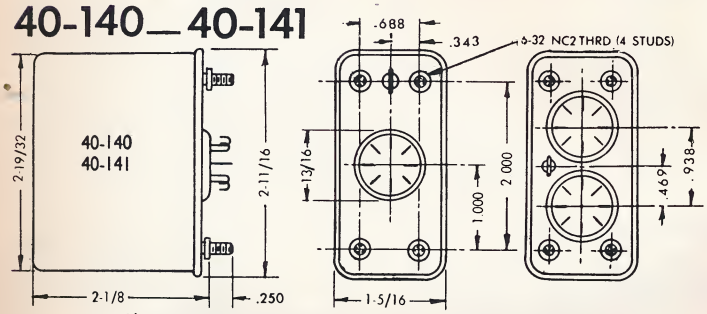


WD-9 4PDT, 14-hook

Class 22 Relay—6 springs per stack, total 12 springs.
8- or 14-pin Solder Terminal Header.

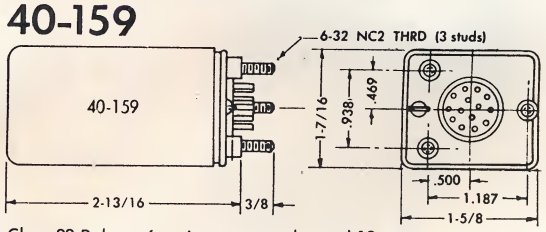
For Relays in Stock see Table C

40-140—40-141



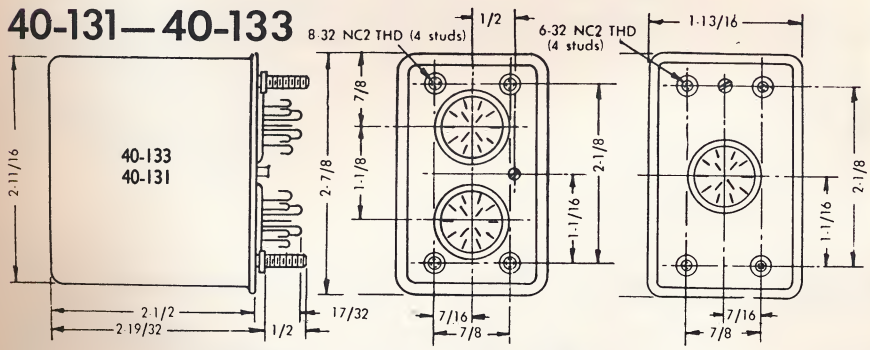
Class 22 Relay, 9 springs per stack, total 18 springs.
40-140 8 or 14 pin solder Terminal Header.
40-141 two 8- or two 14-pin solder terminal header

40-159



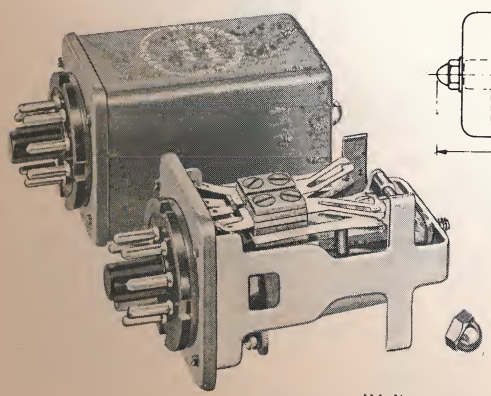
Class 22 Relay—6 springs per stack, total 12 springs.
14-pin Miniature Plug.
40-159-2: "X" is 2-27 32 max. based on 1 16 thk. chassis.
Mates Cinch #54A14775 or equiv. (under chassis mounting).
40-159-5: "X" is 3" max. Mates Cinch = 54A16640 or equiv.

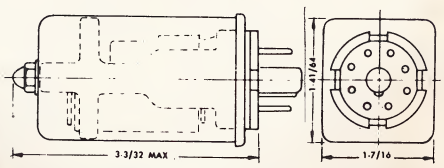
40-131—40-133



Class 22 Relay, 9 springs per stack, total 18 springs.
40-133 two 8- or 14-pin solder terminal headers.
40-131 8- or 14-pin solder terminal header.

40-284 Removable Dust Cover for Class 22 Relays





Available with Class 22 Relays—AC with contact combinations to DPDT; DC with contact combinations to 3PDT; Class 22T Twin Contact; 22S Time Delay, and 22R Power Relays.

For Relays in Stock see Table D

†Voltage operated relays pull in at 85% of nominal voltage

Table C—Class 22HS Relays—in stock for immediate

CONTACTS: Code 10[illegible] Oxide, rated 5 ampere[illegible] VDC, non-inductive load. 40-[illegible] Enclosure

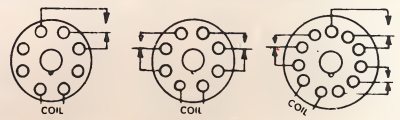
contact comb.	†voltage	res. ohms	nom. power	Stock Part No.
alternating current voltage actuated				
4PDT WD-9	115VAC	500	5VA	W22AHSX32
direct current voltage actuated				
4PDT WD-9	6VDC	20	2.0W	W22HSX144
	12VDC	80	2.0W	W22HSX145
	24VDC	375	1.5W	W22HSX146
	110VDC	8000	1.5W	W22HSX147

†Voltage operated relays pull in at 85% of nominal voltage

Table D—Class 22CP Relays—in stock for immediate shipment

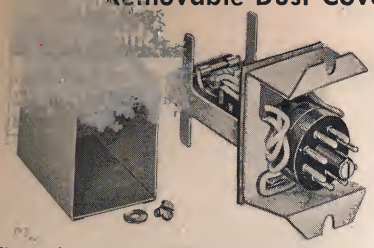
CONTACTS: Code 105, Silver Cadmium Oxide, rated 5 amperes at 115 VAC or 32 VDC, non-inductive load. 40-284 Enclosure

contact comb.	†voltage	res. ohms	nom. power	Stock Part No.
alternating current voltage actuated				
DPDT WD-5	115VAC	500	5VA	W22CPX60
direct current voltage actuated				
SPDT WD-4	6VDC	20	2.0W	W22CPX44
	12VDC	80	2.0W	W22CPX45
	24VDC	375	1.5W	W22CPX46
	110VDC	8000	1.5W	W22CPX47
DPDT WD-5	6VDC	20	2.0W	W22CPX48
	12VDC	80	2.0W	W22CPX49
	24VDC	375	1.5W	W22CPX50
	110VDC	8000	1.5W	W22CPX51
3PDT WD-6	6VDC	20	2.0W	W22CPX52
	12VDC	80	2.0W	W22CPX53
	24VDC	375	1.5W	W22CPX54
	110VDC	8000	1.5W	W22CPX55
DC current actuated for plate circuit operation				
SPDT WD-4	4.5 MA	5000	100 MW	W22CPX57
	6.0 MA	2700		W22CPX58
	3.2 MA	10000		W22CPX59
DPDT WD-5	4.5 MA	10000	200 MW	W22CPX56

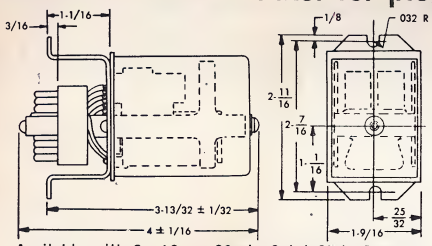


WD-4 SPDT, 8-pin WD-5 DPDT, 8-pin WD-6 3PDT, 11-pin

Removable Dust Cover with Hold Down Bracket for plug-in mounted relays



The enclosure support frame is assembled with the relay. Mounts in any position. Enclosure fits over support frame and is secured to the frame with a single screw.



Available with 8-, 12- or 20-pin Octal Style Phenolic Plugs; mate Amphenol Socket No. 77-MIP-8, or 20 (above chassis mounting) or equiv. For Class 22 Relays, AC to 2PDT; DC to 6PDT; also 22T Twin Contact, 22S Time Delay, and 22R Power Relays.

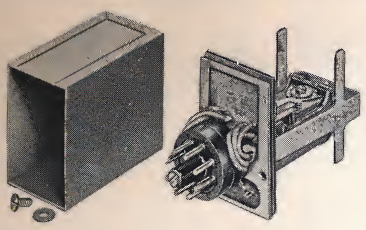
Table E—Class 22CP Relays—in stock for immediate shipment

CONTACTS: Code 105, Silver Cadmium Oxide, rated 5 amperes at 115 VAC or 32 VDC, non-inductive load.

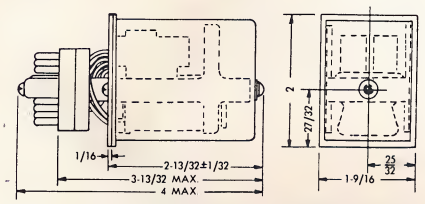
contact comb.	†voltage	res. ohms	nom. power	Stock Part No.
	direct current voltage actuated			
6PDT WD-7	6VDC	12	3.0W	W22CPX61
	12VDC	50		W22CPX62
	24VDC	225		W22CPX63
	110VDC	5000		W22CPX64

†Voltage operated relays pull in at 85% of nominal voltage

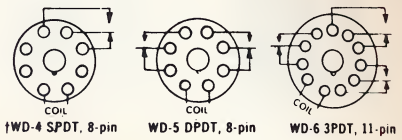
45-246 Removable Dust Cover for Plug-in Mounted Relays



The enclosure support frame is assembled with the relay and built-in hold-down bracket. Mounts in any position—no hold-down clamp required. Enclosure fits over support frame and is secured to the frame with a single screw.

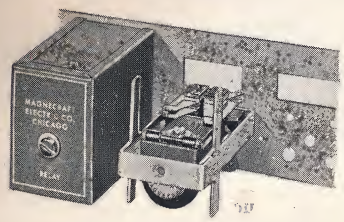


Available with 8-, 12- or 20-pin Octal Style Phenolic Plugs; mate Amphenol Socket No. 77-MIP-8, or 20 (above chassis mounting) or equiv. For Class 22 Relays, AC to 2PDT; DC to 6PDT; also 22T Twin Contact, 22S Time Delay, and 22R Power Relays.

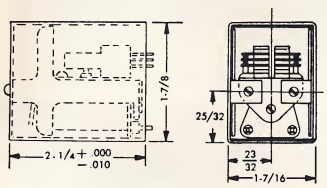


†WD-4 SPDT, 8-pin WD-5 DPDT, 8-pin WD-6 3PDT, 11-pin

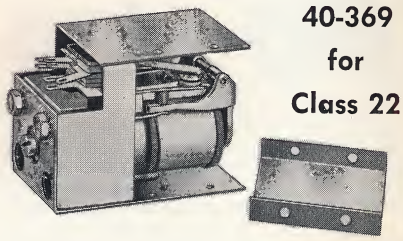
45-174 Removable Dust Cover strip, panel or chassis mounted



Enclosure support frame attaches to strip, panel or chassis with same screws that mount the relay.

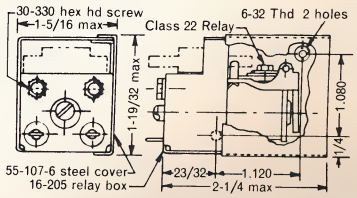


Available with Class 22 Relays; AC to 2PDT; DC to 6PDT; also 22T Twin Contact, 22S Time Delay, and 22R Power Relays.

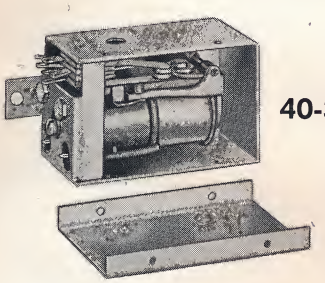


40-369 for Class 22

Class 22 Relay, 6 springs per stack, total 12 springs. Solder type terminals for contacts and coil

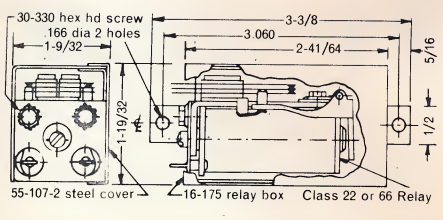


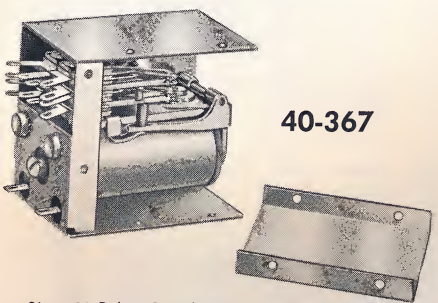
Low Cost Dust Covers for Class 22, 22T, 22S, and 22R Relays



40-366

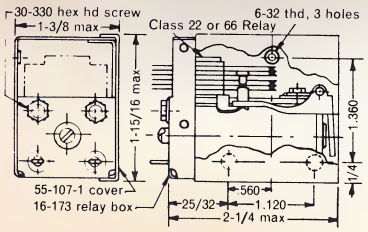
Class 22 Relay, 3 springs per stack, total 6 springs. Solder type terminals for contacts and coil

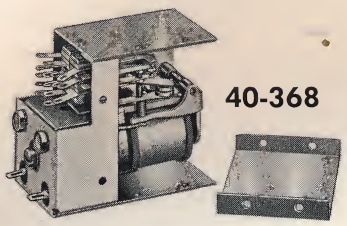




40-367

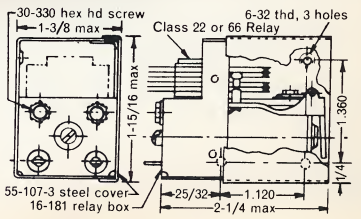
Class 22 Relay, 9 springs per stack, total 18 springs. Solder type terminals for contacts and coil



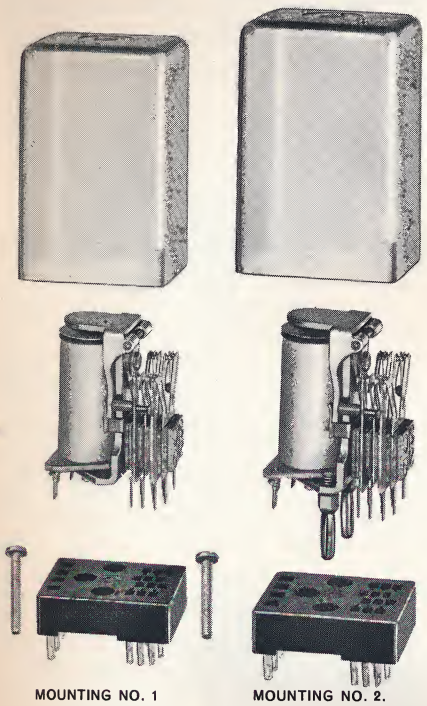


40-368

Class 22 Relay, 9 springs per stack, total 18 springs. Solder type terminals for contacts and coil



Class 22PM Direct Plug-in Relay Assembly with Snap-on Dust Cover



MOUNTING NO. 1 MOUNTING NO. 2.

The Class 22PM Relay assembly includes a Class 22 Relay (see page 22) with plug-in terminals, a molded mounting socket and a clear plastic snap-on dust cover.

The plug-in terminals eliminate expensive internal wiring and the possible failure of internal connections.

The Class 22PM Relay Assembly is available with all Class 22 Relays, page 22; Class 22T Relays, page 24, and Class 22S Time Delay Relays, page 23.

Table A–Class 22TPM Assemblies

Relay Assemblies with Mounting No. 1

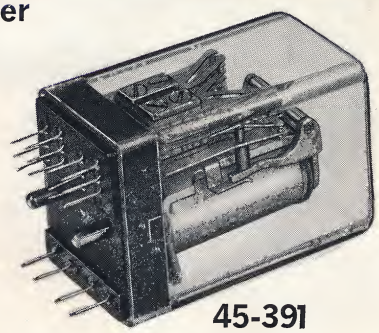
Contacts: Code 106 Twin Palladium (see Class 22T, page 24) rated 4 amperes at 115 VAC or 32 VDC non-inductive load.

Contact Comb.	†24VDC		†110 VDC	
	Cat. No.	Ohms	Cat. No.	Ohms
DPDT (2C)	*W22TPMX-1	500	22TPMX-5	6000
4PDT (4C)	*W22TPMX-2	500	22TPMX-6	6000
6PDT (6C)	22TPMX-3	375	22TPMX-7	5000
8PDT (8C)	22TPMX-4	225	22TPMX-8	5000

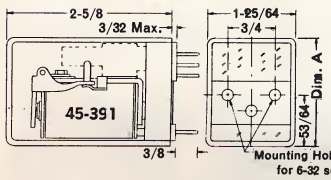
DPDT (2C) 115 VAC: Part No. *W 22ATPMX-1
4PDT (4C) 115 VAC: Part No. *W 22ATPMX-2

*W prefix indicates relay carried in stock.

For Custom-Built Class 22PM Relay Assemblies with Class 22, Class 22T, or Class 22S Relays please send your specifications.



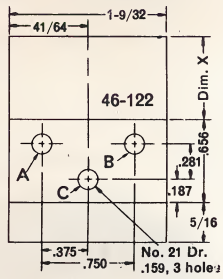
45-391



45-391-1: Dim. A, 1-45/64, 16-pin, for up to 12 contact springs and 4 coil terminals.
45-391-2: Dim. A, 2-7/64, 28-pin, for up to 24 contact springs and 4 coil terminals.

Socket Mounting Layout for Class 22 PM Relay Assemblies

Dim. X:
21/32 for 16-pin
1-1/32 for 28-pin



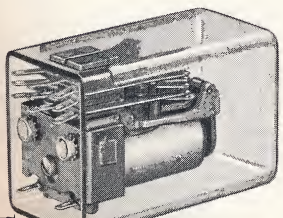
MOUNTING NO. 1. Socket is mounted with two 6-32 x 5/8 screws in chassis holes A and B with nuts on terminal side of socket. Relay is plugged into socket but not fastened.

MOUNTING NO. 2. Socket is secured to chassis with one 6-32 x 5/8 screw in chassis hole C. Relay is equipped with two banana plugs that pressure fit openings in the socket, permitting quick plug in.

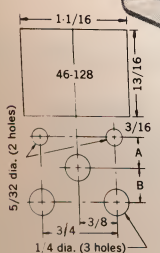
†Voltage operated relays pull in at 85% of nominal voltage

Snap-on Dust Cover Assemblies for Classes 22 and 66 Relays

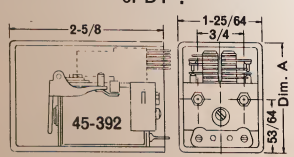
45-392



Class	dim. A	dim. B
22:	9/32	5/16
66:	5/16	11/32

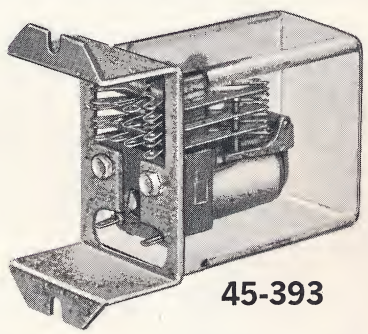


Removable snap-on dust cover assembly for strip, panel or chassis mounting. Attaches to customer's strip, panel or chassis with the same screws that mount the relay. (see MOUNTING, page 22) For Class 22 Relays—AC to 2PDT, DC to 8PDT*.



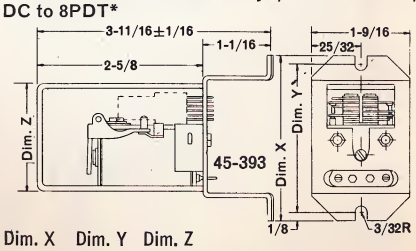
Dim. A: 1-45/64 to 4 form C 2-7/64 to 8 form C

*Also available with Class 22T, page 24, 22S Time Delay, page 23 and 22R Power Relay, page 24.

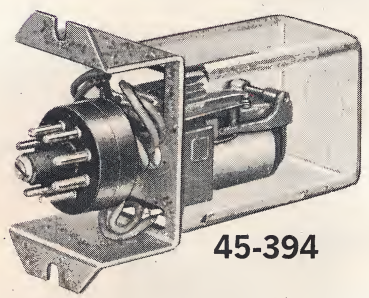


45-393

Removable, snap-on dust cover assembly with stand-off bracket for chassis or panel mounting. The enclosure support bracket is assembled with the relay and built-in stand-off bracket. Useful for applications with no wiring through panel. Available for Class 22 Relays; AC to 2PDT, DC to 8PDT*

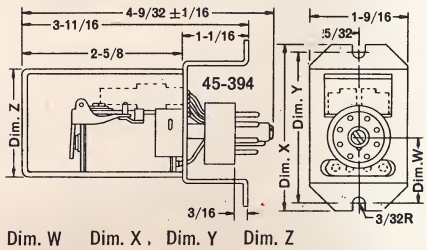


Dim. X	Dim. Y	Dim. Z
2-11/16	2-7/16	1-45/64 up to 4 form C
2-29/32	2-21/32	2-7/64 up to 8 form C



45-394

Removable snap-on dust cover assembly with plug-in mounting and hold-down bracket. The enclosure support bracket is assembled with the relay and built-in hold-down bracket. Available with 8-, 12-, or 20-pin Octal Style Phenolic plug (mate Amphenol Sockets No. 77MIP-8, -12 and -20, above chassis mounting or equivalent) Available with Class 22 Relays—AC to 2PDT, DC to 6PDT*



Dim. W	Dim. X	Dim. Y	Dim. Z
1-1/16	2-11/16	2-7/16	1-45/64 up to 3 form C
1-5/32	2-29/32	2-21/32	2-7/64 up to 6 form C

RELAY DEFINITIONS

The following definitions, except those preceded by an asterisk(*) are reproduced from the American Standard Definitions and Terminology for Relays, C83.16-1959, Copyright 1959 by A.S.A.; copies of which may be purchased from the American Standards Association at 10 East 40th Street, New York, N.Y.

Armature: The moving magnetic member of an electromagnetic structure.

Armature Overtravel: That portion of the available armature stroke occurring after the contacts have touched.

Back Contacts: Sometimes used for Contacts, Normally Closed.

Backstop: That part of the relay which limits the movement of the armature away from the pole face or core. In some relays a normally closed contact may serve as backstop.

***Bi-Stable Contact:** The armature contact remains in its last operated position until the magnetic polarity of the coil is reversed.

Blades: Sometimes used for Springs, Contact.

Bobbin: Same as Spool.

Bounce, Contact: Intermittent closure of open contacts or opening of closed contacts; **Bounce** implies the motion resulting from contact impact. Cf. Chatter, contact.

***Buffer, Armature:** An insulating part which transmits the movement of the armature to an adjacent contact spring.

***Buffer, Spring:** An insulating part which transmits the movement of the armature from one movable contact spring to another in the same pileup.

Chatter, Contact: The undesired intermittent closure of open contacts or closed contacts. It may occur either when the relay is operated or released or when the relay is subjected to external shock or vibration.

Coaxial Relay: A type of relay designed to switch high frequency circuits.

Coil: One or more windings on a common form.

Coil Terminal: A device, such as a solder lug, binding post, or similar fitting, to which the coil power supply is connected.

Contact, Armature: (1) A contact mounted directly on the armature. (2) Sometimes used for Contact, Movable.

Contact Arrangement: The combination of contact forms that make up the entire relay switching structure.

Contact Gap: The distance between mating contacts with the contacts open.

Contact, Movable: The member of a contact pair that is moved directly by the actuating system.

Contact, Stationary: The member of a contact pair that is not moved directly by the actuating system.

Contacts: The current-carrying parts of a relay that engage or disengage to open or close electrical circuits.

Contacts, Break: Same as Contacts, Normally Closed.

Contacts, Bridging: A contact form in which the moving contact touches two stationary contacts simultaneously during transfer.

Contacts, Low Capacitance: A type of contact construction proving low intercontact capacitance.

Contacts, Low-Level: Contacts which control only the flow of relatively small currents in relatively low-voltage circuits; e.g., alternating currents and voltages encountered in voice or tone circuits, direct currents, and voltages of the order of microamperes and microvolts, etc.

Contacts, Make: Same as Contacts, Normally Open.

Contacts, Non-Bridging: A contact arrangement in which the opening contact opens before the closing contact closes.

Contacts, Normally Closed: A contact pair which is closed when the coil is not energized.

Contacts, Normally Open: A contact pair which is open when the coil is not energized.

Contacts, Preliminary: Contacts which open or close in advance of other contacts when the relay is operating.

***Core:** Sometimes used for polepiece.

***De-Energize:** To disconnect the relay coil from its power source.

Delay Relay: A relay having an assured time interval between energization and operation or between de-energization and release.

Drop-Out: Same as Release.

Duty Cycle: A statement of energized and de-energized time in repetitious operation, as: 2 seconds on, 6 seconds off.

***Energize:** To connect a relay coil to its power source.

Follow, Contact: The displacement of a stated point on the contact actuating member following initial closure of a contact.

***Frame:** The main supporting part of a relay which may be part of the magnetic circuit. Sometimes used for heelpiece.

Functioning Time: The time between energization and operation or between de-energization and release.

Heel Piece: The portion of a magnetic circuit of a relay that is attached to the end of the core remote from the armature.

Hermetically Sealed Relay: A relay in a gas-tight enclosure which has been completely sealed by fusion or other comparable means to insure a low rate of gas leakage over a long period of time.

Hold: A specified functioning value at which no relay meeting the specification may release.

Hum: The sound emitted by relays when their coils are energized by alternating current or in some cases by unfiltered rectified current.

Latching Relay: A relay having contacts that lock in either the energized and de-energized positions, or both, until reset either manually or electrically.

Non-Operate Value: A specified functioning value at which no relay meeting the specifications may operate.

Normal Condition: The de-energized condition of the relay.

Operate: The condition attained by a relay when all contacts have functioned. See also Time, Actuation, Contact.

Operate Time: See Time, Operate.

Operate Value, Must: A specified functioning value at which all relays meeting the specification must operate.

Pickup Value: Sometimes used for Operate Value, Must.

Pileup: A set of contact arms, assemblies, or springs, fastened one on top of the other with insulation between them.

Polarized Relay: A relay whose operation is dependent upon the polarity of the energizing current.

***Polepiece:** The magnetic part about which the coil is wound.

Pull-In Value: Sometimes used for Operate Value, Must.

Rating, Contact: A statement of the conditions under which a contact will perform satisfactorily.

Relay: An electrically controlled device that opens and closes electrical contacts to effect the operation of other devices in the same or another electrical circuit.

Release: The condition attained by a relay when all contacts have functioned and the armature (where applicable) has reached a fully opened position.

Release Value, Must: A specified functioning value, at which all relays meeting the specification must release.

***Single-Side-Stable Contact:** The armature contact releases from the operated position when the coil current falls below the drop-out value.

Spool: A flanged form upon which a coil is wound.

Spring, Contact: (1) A current-carrying spring to which the contacts are fastened. (2) A non-current-carrying spring that positions and tensions a contact-carrying member.

Stack: Sometimes used for Pileup.

Time Delay Relay: Same as Delay Relay.

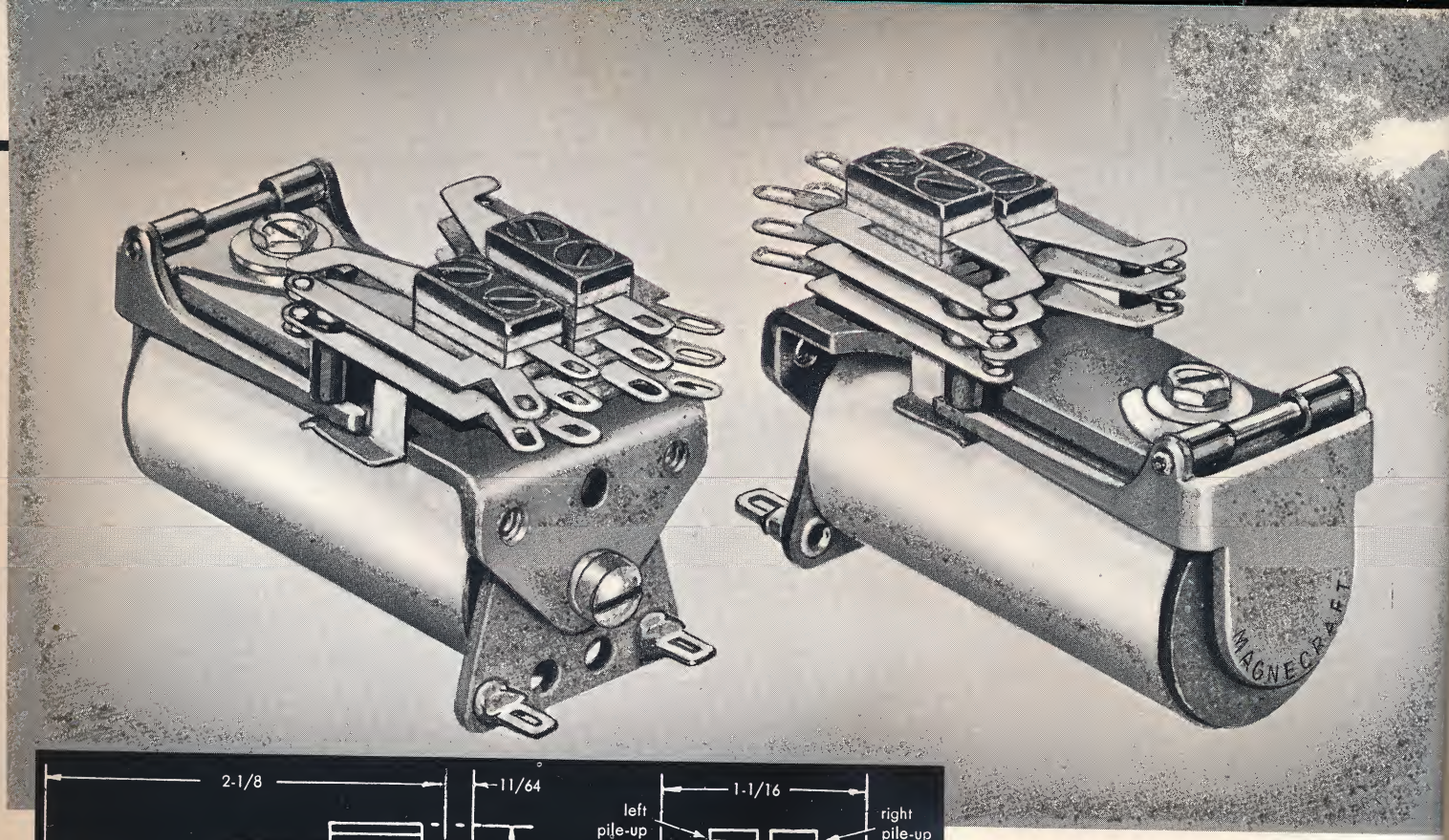
Time, Operate: The time interval from coil energization to the functioning time of the last contact to function. Where not otherwise stated the functioning time of the contact in question is taken as its initial functioning time.

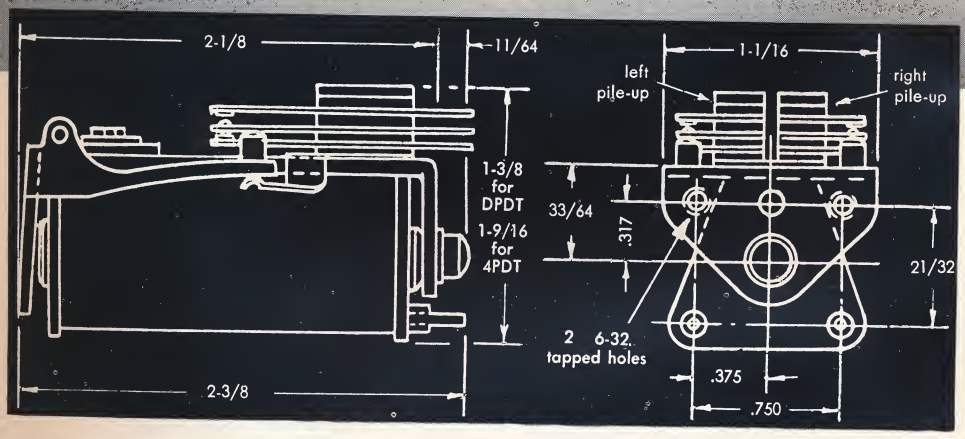
Time, Release: The time interval from coil de-energization to the functioning time of the last contact to function. Where not otherwise stated the functioning time of the contact in question is taken as its initial functioning time.

Time, Transfer: The time interval between opening the closed contact and closing the open contact of a break-make contact form.

Travel, Armature: The distance traveled during operation by a specified point on the armature.

Wipe, Contact: The sliding or tangential motion between two contact surfaces when they are touching.





Medium Size Telephone Type Relay

Made for AC and DC Operation

MOUNTING

Coil and contact spring terminals are at mounting end—wiring can be concealed when Relay is mounted. Frame tapped for two No. 6-32 screws (not supplied). May be mounted on individual base or strip mounted.

No. 16-123, L-mounting bracket with two No. 6-32 screws (see page 22) also available with Class 66 Relays.

Class 66 Relay Variations

Class 66 MAGNECRAFT Relays are designed to meet conditions requiring minimum coil power and to afford these advantages:

1. High contact pressure with low operating wattage (see chart below).
2. Reliable switching to 8PDT from DC and 4PDT from AC.
3. Space for long slugs to permit long operate and long release delay.

Class 66 Relays are made with both long and short lever to armature ratios, making available the favorable ratio for operating requirements.

High Reliability construction features of Class 66 Relays include:

1. A heavy heel piece is used to stabilize contact adjustments.
2. A unique pin-type armature hinge, with stainless steel pin and heavy duty yoke with precision reamed bearing surfaces.
3. Wear resisting buffers firmly attached to contact springs.

Class 66 Relays are available to meet military specifications for shock and vibration, also to withstand wide temperature variations.

Class 66—Sensitivity—Operate and Release Time

	SPDT	DPDT	3PDT	4PDT
Min. Operate MW (sensitivity)	60	120	200	300
Operate Time — MS maximum	9.0	13.0	14.0	16.0
Release Time — MS maximum	13.0	7.0	5.5	4.0

COIL DATA

1. Standard operating voltages are listed in Table 6 below. Available for intermediate and higher operating voltages up to 230 volts D.C. and 230 volts A.C. (60 cycles).
2. D.C. Power Requirements: Nominal, 3.0 watts; minimum .05 watts; maximum, for continuous duty, 5.0 watts.
3. A.C. nominal volt-ampere requirements, 5 V.A.
4. D.C. resistance range, .12 to 26,000 ohms.
5. Insulation to ground tested at 750 volts A.C. RMS standard. Higher dielectric strengths available on request.
6. Terminals—solder type (standard) or wire leads.

CONTACTS

1. Code 104: Paladium, .075 dia. x .020 thick, rated 3 amperes*

   Code 105: Silver Cadmium Oxide, .125 dia. x .020 thick, rated 5 amperes*

   Code 108: #1 Gold Alloy, .062 x .020 thick, for low level signal circuits.

   Code 106: Bifurcated Palladium, .062 dia. x .020 thick, rated 4 amperes* (see 66T, page 32)

   Code 111: Bifurcated #1 Gold Alloy, .062″ x .020 thick, for low level signal circuits (see 66T, page 24).

   Code 109: Silver Cadmium Oxide, .187 dia. x .047, rated 10 amperes* (see 66R, page 32).

   Code 112: Silver Tungsten, .187 dia. x .050 thick, rated 12 amperes* (see 66 R, page 25).

   Code 118: Silver Tungsten Carbide, .250 dia. x .050 thick, rated 15 amperes* (see 66R, page 25).
2. Standard contact arrangements (see page 4.) Available for D.C. with 12 contact arms per stack (24 arms per relay); for direct A.C. operation with 6 contact arms per stack (12 arms per relay); and rectified for AC frequencies from 50 to 400 CPS with up to 12 contact arms per stack (24 arms per relay)
3. Standard insulation—Fiber glass melamine tested at 750 volts A.C. RMS, for breakdown to ground. Higher dielectric strengths available on special order.

*at 115 VAC or 32 VDC, non-inductive load.

Table A—Class 66 Operating Data

Voltage	D.C.		60 CPS	
	D.C. Ohms	Wire Size	D.C. Ohms	Wire Size
6	12	27	2	24
12	60	30	5	26
24	250	33	15	28
48	850	36	100	33
110	5750	40	300	34
230	19000	43	2000	39

Table 6—Class 66 Standard Coil Data Chart

Wire	Turns	Ohms*	Wire	Turns	Ohms*	Wire	Turns	Ohms*
27	1500	12	33	7000	250	39	26300	4000
28	2000	20	34	7900	325	40	31400	5750
29	2500	30	35	10000	540	41	38900	8500
30	3200	60	36	12500	850	42	41000	11000
31	4000	85	37	16500	1500	43	56900	19000
32	5300	135	38	19000	2000	44	67000	26000

*Plus or minus 10% at +25°C

Suggestions for Ordering or Requesting Quotation

Order STOCK or STANDARD Relays by Catalog (Part) Number.

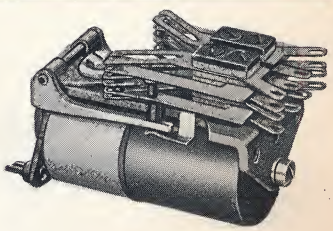
When ordering or requesting information about special relays please specify:

1. Type (Magnecraft Class No.) with type and number of enclosure if desired.
2. Operating Coil Voltage or Current—AC or DC.
3. Contact Combination required.
4. Contact load in volts and amperes.
5. Type of load—inductive, non-inductive, motor, lamp, heater, etc.

SPECIAL RELAYS—MAGNECRAFT designs and builds Relays to meet special requirements. In case you do not find the relay you need just send the complete specifications you have to meet.

CLASS 66S TIME DELAY RELAY—DC ONLY

A Class 66 Relay in which a portion of the coil space is occupied by a copper slug. The slug causes a delay in any change of flux in the magnetic circuit of the relay. Position of the copper slug determines whether the relay has an "operate delay" or a "release delay" as shown in the notes.

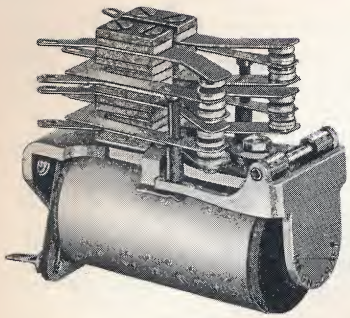


Contacts	Coil Operating Voltage—DC Only							
	12	24	48	115	12	24	48	115
	*Operate Delay milliseconds				†Release Delay milliseconds max.			
SPDT	70	70	80	85	225	225	225	225
DPDT	80	80	85	100	175	175	175	175
3PDT	80	80	85	100	125	125	125	125
4PDT	80	80	85	125	75	75	75	75

*Based on a relay with 1″ long copper slug at armature end of the coil; and which pulls in at 90% (or less) of the operating voltage at which the delay is measured.
†Based on a relay with 1″ long copper slug at the heel end of the coil and a minimum coil wattage of 4 watts.
All the above data is based on the use of regulated supply voltage.

Standard Coil Data—66S with 1″ Copper Slug

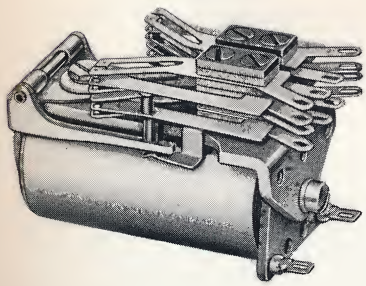
Wire	Turns	Ohms*	Wire	Turns	Ohms*	Wire	Turns	Ohms*	Wire	Turns	Ohms*
27	600	5.0	32	1700	41.0	37	6600	600	41	16000	3500
28	800	9.0	33	3000	100	38	8250	900	42	25840	4000
29	1000	14.0	34	3400	135	39	10000	1500	43	28000	11000
30	1150	19.0	35	3500	225	40	12350	2300	44	33000	15000
31	1500	30.0	36	5500	400	*Plus or minus 10% @ + 25° C.					



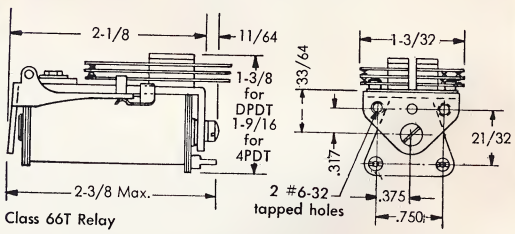
Class 66A Relay for AC Operation

Developed especially for reliability, and long service life with Alternating Current operation. Features include shaded pole construction with the finest magnetic materials in the iron circuit and short operating arm to armature ratio for maximum contact pressure.

The 66A Relay is available with contact combinations up to 4PDT with contacts for all kinds of applications ranging from bifurcated twin gold alloy contacts for low level switching to 10 ampere contacts at 115 VAC non-inductive. Available for operating voltages to 230, 60 cycles; in open type, with dust cover and with hermetic sealed enclosures.



Class 66T "Twin" Contact



Class 66T Relay

Has bifurcated (twin) contacts for reliable switching of extremely low voltage and low current.

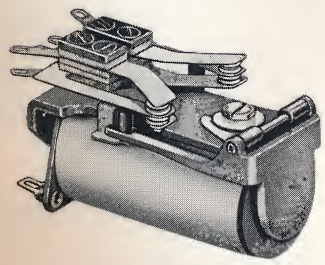
Flexibility of the long, bifurcated contact springs enables the twin points to make contact independently, thus permitting one point to make contact even when the other is blocked by dust or grit. Contact combinations to 8PDT for DC operation; 4PDT for AC.

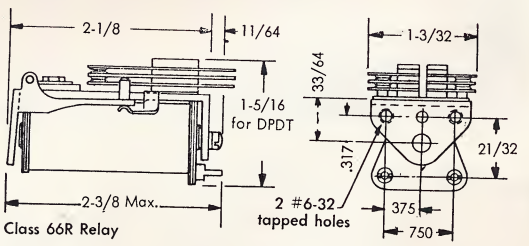
Table A—Class 66T Relays—in stock for immediate shipment

CONTACTS. Code 106—Bifurcated Palladium rated 4 amperes at 115 VAC or 32 VDC, non- inductive load.

contact comb.	†voltage	res. ohms	nom. power	Stock Part No.
alternating current voltage actuated				
4PDT	115VAC	300	6VA	W66ATX2
direct current voltage actuated				
4PDT	6VDC	30	1.0W	W66TX23
	12VDC	135		W66TX24
	24VDC	540		W66TX25
8PDT	6VDC	20	2.0W	W66TX29
	12VDC	85		W66TX30
	24VDC	225		W66TX31
	110VDC	5750		W66TX32
DC current actuated for plate circuit operation				
4PDT	5.3 MA	11000	300MW	W66TX26
6PDT	6.75 MA	11000	500MW	W66TX27
8PDT	8.5 MA	11000	800MW	W66TX28

Class 66R Power Relays





Class 66R Relay

Has heavy duty contact arms and contacts with nominal rating of 10 amperes at 115 VAC or 32 VDC non-inductive load. Can be furnished in combinations with bifurcated contacts for switching both heavy loads and low level signal loads with the same relay.

Available with contact combinations up to 4PDT for DC operation and DPDT for AC operation.

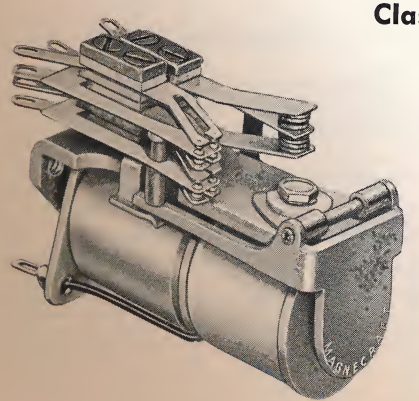
Table B. Class 66AR Standard Relays

CONTACTS. Code 109—Silver Cadmium Oxide rated 10 amperes at 115 VAC or 32 VDC, non-inductive load.

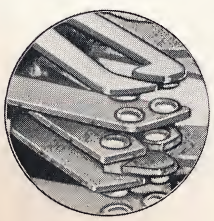
contact comb.	†voltage	res. ohms	nom. power	Catalog Number
alternating current voltage actuated				
4PDT	24VAC	15	6VA	66ARX10
	115VAC	300		66ARX11

†Voltage operated relays pull in at 85% of nominal voltage

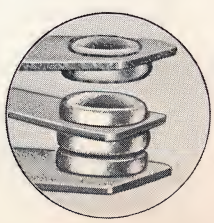
Class 66 Relay with Low Level and Power Contacts



Twin Contacts for low level switching



Heavy Duty Contacts for Power Switching

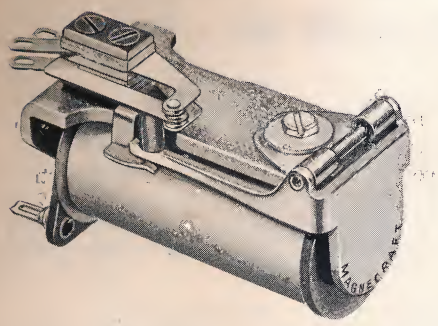


The relay shown here truly demonstrates the wide variations in custom-built features obtainable in MAGNECRAFT Class 66 and Class 22 Relays.

This relay provides low level switching with Twin Contacts (see 66T above) and heavy amperage switching with Power Contacts (see 66R above). In addition a copper slug in the relay provides release time delay. The same features are obtainable in Class 22 Relays as well as in both Class 66 and 22 Relays without the time delay feature.

Many other features can be furnished in MAGNECRAFT custom-built telephone type relays. For prompt action in securing relays to meet special or critical applications send complete requirement specifications.

Class 66—35-Milliwatt—Sensitive Relays



Class 66 Relay design is especially adaptable to great sensitivity combined with high reliability. Standard 35-milliwatt sensitive relays are listed in Table C. Class 66 Relays can be custom-built to meet exacting sensitivity requirements with maximum reliability. For recommendations send requirement specifications.

Table C. Class 66 Relays — 35-milliwatt — Sensitive

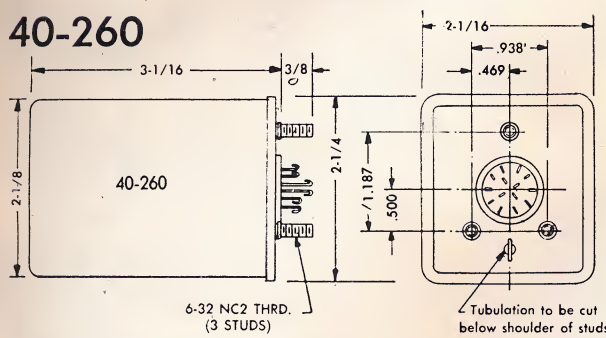
CONTACTS — SPDT, special alloy gold-plated, rated 2 amperes at 115VAC or 32VDC non-inductive load.

Pull-in MA	rec'mended Volts	*Resis. Ohms	Catalog Number
10.0	—	325	66X-112
6.5	6VDC	850	66X-113
4.2	12VDC	2000	66X-114
1.8	24VDC	11000	66X-115
1.2	—	26000	66X-116

*Plus or minus 10% at +25°C

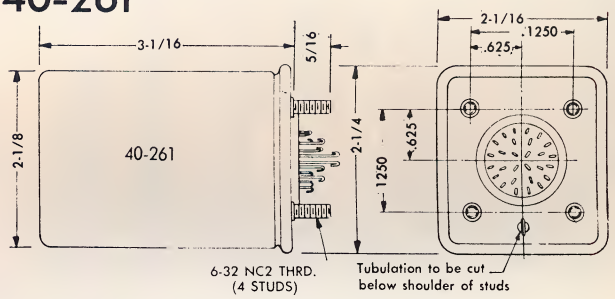
Class 66 Hermetically Sealed or Dust Tight Enclosures

40-260



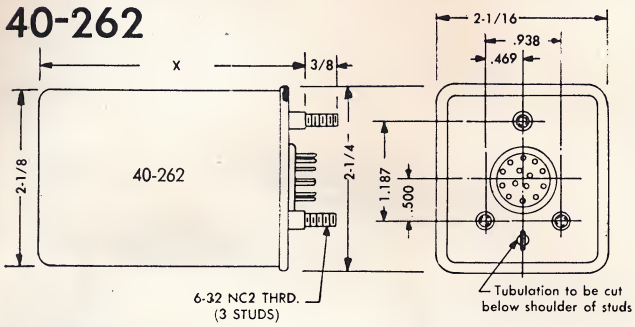
Class 66 Relay—6 springs per stack, total 12 springs. 8- or 14-pin solder terminal header.

40-261



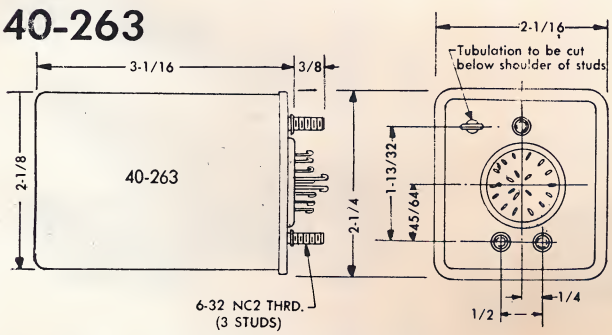
Class 66 Relay—12 springs per stack, total 24 springs. 28-pin solder terminal header.

40-262



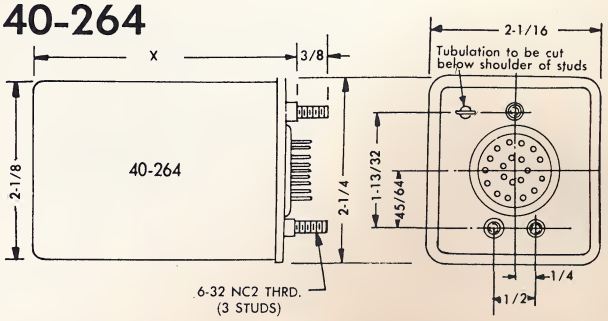
Class 66 Relay—6 springs per stack, total 12 springs. 14-pin miniature plug-in header.
- 40-262-1—Dim. "X" is 3-7/32" max. based on 1/16" thick chassis: mates with Cinch socket 54A14775 or equivalent.
- 40-262-2—Dim. "X" is 3-3/8"; mates with Cinch socket 54A16640 or equivalent (top chassis mounting).

40-263



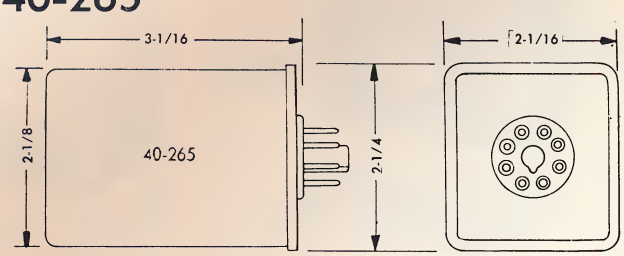
Class 66 Relay—9 springs per stack, total 18 springs. 20-pin solder terminal header.

40-264

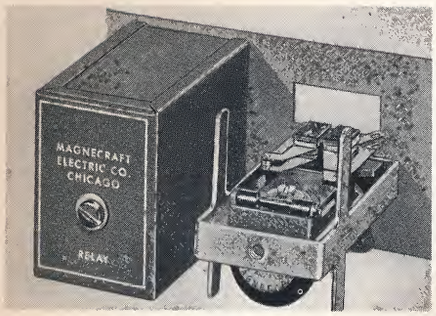


Class 66 Relay—9 springs per stack, total 18 springs. 20-pin miniature plug-in header.
- 40-264-1—Dim. "X" is 3-5/32" based on 1/16" thick chassis; mates Cinch 54A17686 socket or equivalent (under chassis mounting).
- 40-264-2—Dim. "X" is 3-19/64" mates Cinch 54A22106 socket or equivalent (above chassis mounting).

40-265



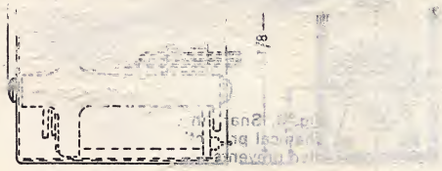
Class 66-Relay—9 springs per stack, total 18 springs. 8-, 12- or 20-pin octal plug; mates Amphenol MIP-8, -12 or -20 socket or equivalent.



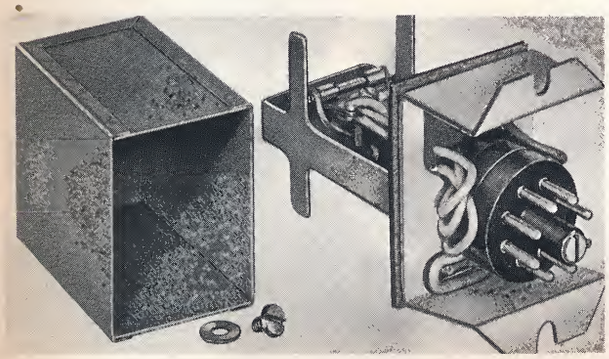
45-200 Removable Dust Cover for 66

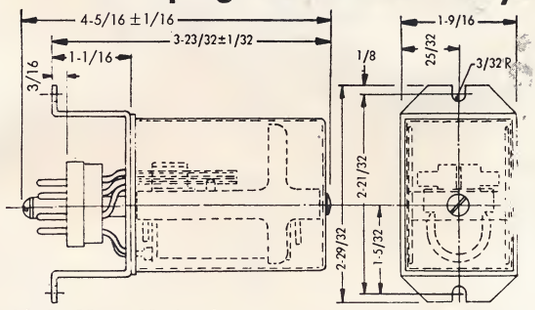
The enclosure support frame attaches to customer's strip, panel or chassis with the relay mounting screws. A single screw fastens the cover to the frame.

Available with Class 66 Relays; AC, with contact combinations to 4PDT; DC, with contact combinations to 8PDT; also Class 66T Twin Contacts, 66S Time Delay, and 66R Power Relays.



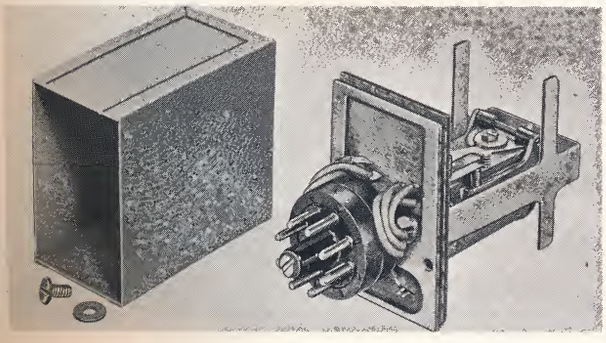
45-201 Removable Dust Cover with hold-down bracket for plug-in mounted relays

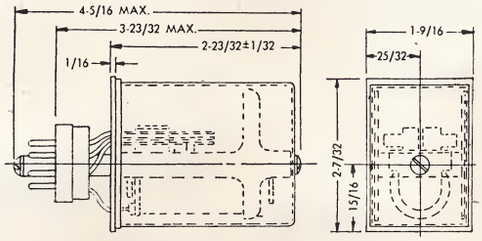




Available with 8-, 12- or 20-pin plug; mate with Amphenol Socket (above chassis mounting) 77-MIP-8, -12 or -20 or equivalent. Available with same Class 66 Relays as 45-200 Cover, above.

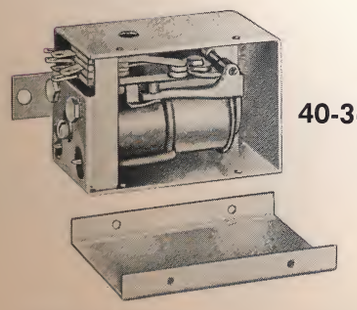
45-247 Removable Dust Cover for plug-in mounted relays





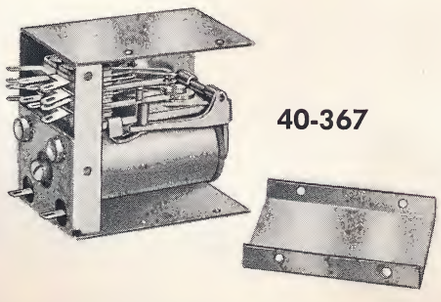
Available with 8-, 12- or 20-pin plug; mate with Amphenol Socket (above chassis mounting) 77-MIP-8, -12, or -20 or equivalent. Available with same Class 66 Relays as 45-200 Cover above.

Low Cost Dust Covers for Class 66, 66T, 66S, and 66R Relays



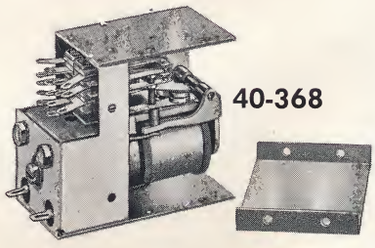
40-366

Class 66 Relay, 3 springs per stack, total 6 springs. Solder type terminals for contacts and coil



40-367

Class 66 Relay, 9 springs per stack, total 18 springs. Solder type terminals for contacts and coil



40-368

Class 66 Relay, 9 springs per stack, total 18 springs. Solder type terminals for contacts and coil

For dimensional diagrams see page 27

NEW Design Concept of Modular Packaging for Both Mercury-Wetted and Dry Reed Relays

Unique Design — Simplicity makes possible NEW LOW COSTS

p-c steel cover—combines mc- ction and magnetic shielding, interaction.

The switch mechanism, hermetically sealed in atmosphere of inert gas in a glass capsule—protected for life from dust, moisture, contamination and tampering.

Fig. 2. Epoxy resin terminal board with tinned terminal supports and terminal pins (one piece) riveted into mortised position.

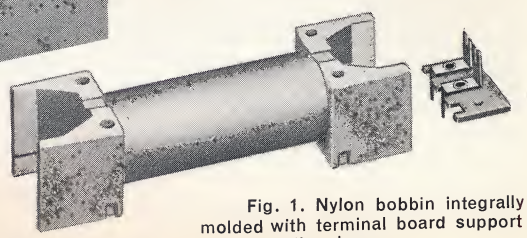


Fig. 1. Nylon bobbin integrally molded with terminal board support and mounting base.

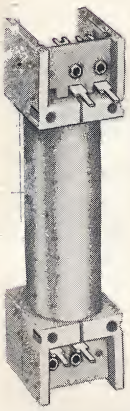


Fig. 5. Epoxy resin terminal board assembly (Fig. 2.) pressed into mortises molded into the Nylon support. This construction assures permanently rigid positioning of the terminal supports and terminal pins.

Fig. 6. Stress-free assembly of the rugged switch support terminals (Fig. 4.) to the tinned terminal supports (Fig. 2). The switch is first positioned with the rugged terminals cradled in the supports, then securely soldered for positive contact and rigid positioning. This construction completely avoids stresses that are created when the support terminal is bent; stresses that transmit to the contact inside the capsule and seriously affect operating stability.

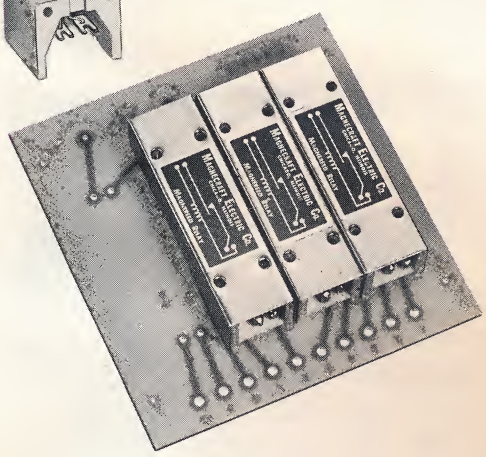


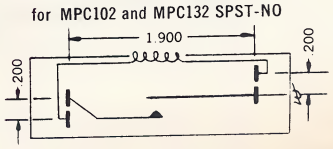
Fig. 7. Quick, plug-in assembly to circuit boards. The steel snap-on cover provides magnetic shielding between coils. Normally, printed circuit soldering is adequate for rigid mounting; four holes for NC-2 screws provide additional hold-down security when required. See Fig. 6.

Extra High Reliability Features

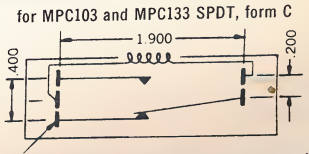
- The reed support terminals are *not bent but soldered to the rigid terminal supports with capsule and coil in position.* The leads are not subjected to stresses that transmit to the reeds inside the capsule and disrupt adjustment stability.
- The *integrally molded Nylon bobbin and mounting base* with mortised assembly of the epoxy resin terminal board rigidly maintain the switch capsule position in the coil.
- Terminal pins spaced on 0.2 inch grid centers *permit wide safety margins in insulation and dielectric strength;* also reduce printed board assembly to a mere plug-in operation.
- The molded Nylon mounting base *assures wide separation of all metallic parts from the circuit board* or other panel.
- The Nylon bobbin and base with Epoxy terminal board assembly *protect the switch capsule, terminals and coil leads* from mechanical injury.
- The steel snap-on cover adds mechanical protection, provides mechanical shielding and *prevents interaction between relays.*

Wiring Diagrams and Terminal Pin Spacings

for MPC102 and MPC132 SPST-NO



for MPC103 and MPC133 SPDT, form C



TOP VIEW .062 dia. holes recommended for terminal pins in pc board.

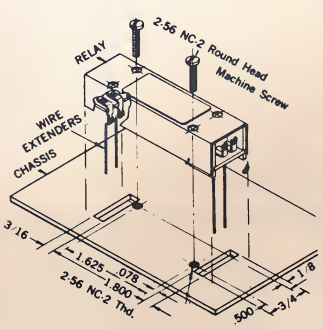


Fig. 8. Front-of-Panel mounting. Use of two diagonally opposed holes is recommended. The wire extenders can be furnished on special order.

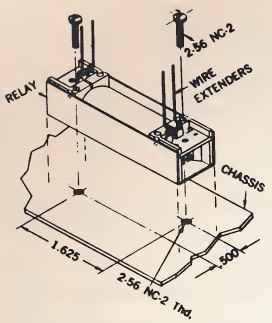


Fig. 9. Back-of-Panel mounting. Use of two diagonally opposed holes is recommended. The wire extenders can be furnished on special order.

132 MPC and 133 MPC Ultra Reliability Mercury-Wetted Contact Relays

Life expectancy exceeding a billion operations, constant contact resistance through life and high reliability switching of loads from 50 VA down to extremely minute current and voltage are some of the marvelous qualities provided in MAGNECRAFT Mercury-Wetted Contact Relays.

These exceptional qualities result from constantly renewed mercury contacts that completely avoid contact erosion, welding bounce and chatter.

Constant contact renewal is achieved by hermetically sealing pre-adjusted contacts and a pool of mercury with an atmosphere of high pressure hydrogen in a glass capsule. The contacts are actuated by a coil around the capsule.

Capillary action keeps the contacts covered with a mercury film. Every operation renews the mercury film contact; variation in contact resistance is less than 10% over life.

Hermetic sealing protects the contacts from dust, corrosive fumes, moisture and tampering. The relays do not deteriorate with age; there is no change in adjustment after the relay is made.

The MPC Modular Package (see page 35) provides stress-free mounting and rigid positioning of switch and coil. In addition, the MPC Package protects switch capsule, coil and terminal connections from mechanical injury and provides ideal mounting for low cost assembly.

COIL DATA (single wound coils*)

1. Standard operating coil voltages and currents are listed in Tables C and D. Intermediate voltages to 110 VDC are available. Standard Coil Data is listed in Table 1, page 38.

2. DC power requirements: Nominal 500 milliwatts. Minimum, 150 milliwatts. Maximum for continuous duty, 2.0 watts.

3. DC resistance range: 3.0 to 7000 ohms standard.

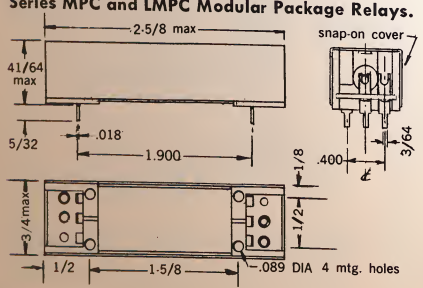
4. Insulation to ground tested—500 V AC RMS Standard.

**Double Wound Coils are available.*

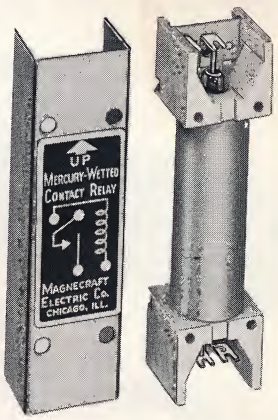
CONTACTS: Standard contact combinations and ratings are listed at the right. Series 133PC can also be furnished with 1 Form D, make-before-break contact combination on special order.

SHOCK and VIBRATION: Withstand non-operating vibration tests of 10 to 500CPS at 10 Gs and 30 Gs of shock for 11 ± 1 millisecond duration with no mechanical damage.

DIMENSIONS—
Series MPC and LMPC Modular Package Relays.



132MPC SPST-NO Mercury-Wetted Relays in MPC Package



Contact Combination: SPST-NO.
Operate Time: 2 ms. average.
Release Time: 2 ms. average.
Operating Position: Upright—not more than 30° from vertical.
Nominal Power: 500 Milliwatts.
Life Expectancy: 1 Billion cycles.
Contacts: Mercury-wetted.
Contact Load Rating: 50VA at 3.0 amps. max. or 400 V max., non-inductive. Switches from 50VA to extremely minute current and voltage reliably.
Contact Resistance: 25 milliohms max.; less than 10% change in contact resistance through life.
Maintenance: No change in adjustment after the relay is made. May be stored indefinitely without deterioration.
Ambient Temperature:—37.8°F to +200°F.

CONSTRUCTION

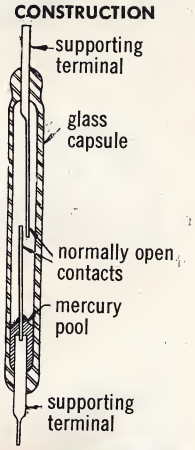
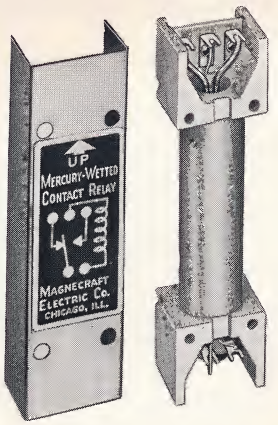


Table C—132MPC SPST-NO in STOCK for Immediate Delivery

Catalog Number	COIL—DC			Catalog Number	COIL—DC		
	MA	†Volts	Ohms		MA	†Volts	Ohms
W132MPCX-1	140	—	30	W132MPCX-4	24	24VDC	1000
W132MPCX-2	85	6VDC	70	W132MPCX-5	12	48VDC	4000
W132MPCX-3	48	12VDC	250	W132MPCX-6	9	—	7000

Dimensions, page 36; wiring diagrams and terminal pin spacings, page 35
†Voltage operated relays pull in at 85% of nominal voltage

133MPC SPDT form C Mercury-Wetted Relays in MPC Package



Contact Combination: SPDT-Form C (Single Side Stable).*
Operate Time: 2 ms. average.
Release Time: 2 ms. average.
Operating Position: Upright—not more than 30° from vertical.
Nominal Power: 500 Milliwatts.
Life Expectancy: 1 Billion cycles.
Contacts: Mercury-wetted.
Contact Load Rating: 50VA at 2.0 amps. max. or 400 V max., non-inductive. Switches from 50VA to extremely minute current and voltage reliably.
Contact Resistance: 25 milliohms max.; less than 10% change in contact resistance through life.
Maintenance: No change in adjustment after the relay is made. May be stored indefinitely without deterioration.
Ambient Temperature:—37.8°F to +200°F.

CONSTRUCTION

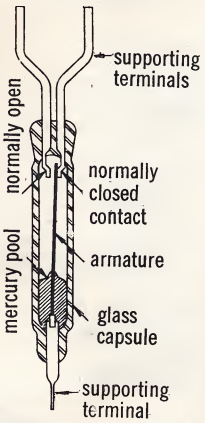


Table D—133MPC SPDT Form C in STOCK for Immediate Delivery

Catalog Number	COIL—DC			Catalog Number	COIL—DC		
	MA	†Volts	Ohms		MA	†Volts	Ohms
W133MPCX-1	140	—	30	W133MPCX-4	24	24VDC	1000
W133MPCX-2	85	6VDC	70	W133MPCX-5	12	48VDC	4000
W133MPCX-3	48	12VDC	250	W133MPCX-6	9	—	7000

Dimensions, page 36; wiring diagrams and terminal pin spacings, page 35
†Voltage operated relays pull in at 85% of nominal voltage
***Single Side Stable**—Armature contact releases from the operated position when coil current falls below the drop out value.

Mercury-Wetted Contact Relay Specials

Available in the following general constructions:
Metal enclosure with octal plug-in base.
Plastic enclosure with octal plug-in base.
Metal enclosure with heavy duty glass-to-metal solder terminal header.
Epoxy encapsulated plastic enclosure with printed circuit mounting.

Class 133 LMPC Mercury-Wetted Magnetic Latching (Bi-Stable*) Relays

MAGNECRAFT Class 133 LMPC Magnetic Latching Relays require no coil current to hold either of two latching positions. This feature makes them ideal for memory applications.

With single wound coils switching is achieved by reversing coil current polarity.

With double wound coils having separate polarized windings, switching is achieved by use of two separate inputs.

Class 133LMPC has the same Ultra Reliability design and construction as Class 132MPC and 133MPC Mercury-Wetted Contact Relays described on page 36.

The unique MPC Modular Package (see pg. 35) provides stress-free mounting, rigid positioning and mechanical protection for switch and coil.

Hermetic sealing protects the contacts from dust, corrosive fumes, moisture and tampering. The relays do not deteriorate with age; there is no change in adjustment after the relay is made.

The MPC Modular Package (see page 35) provides stress-free mounting and rigid positioning of switch and coil. In addition, the MPC Package protects switch capsule, coil and terminal connections from mechanical injury and provides ideal mounting for low cost assembly.

SINGLE WOUND COIL DATA

1. Standard operating coil currents and voltages are shown in Table E. Intermediate voltages to 110 VDC are available. Standard Coil Data is listed in Table 1, page 38.

2. DC power requirements: Nominal, 150 milliwatts. Maximum for continuous duty, 2.0 watts.

3. DC resistance range: 3.0 to 7000 ohms standard.

4. Insulation to ground tested—500 VAC RMS standard.

DOUBLE WOUND COIL DATA

1. Standard operating coil currents and voltages are shown in Table E. Intermediate voltages to 110 VDC are available.

2. DC power requirements: Nominal, 200 milliwatts. Maximum for continuous duty, 2.0 watts.

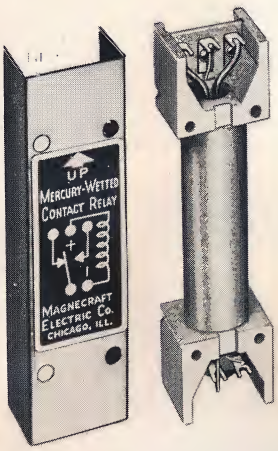
3. DC resistance range: 3.0 to 3000 ohms standard.

4. Insulation to ground tested—500 VAC RMS standard.

CONTACTS

One Form C, break before make, standard. One Form D, make before break, available.

133LMPC SPDT, Form C Magnetic Latching Mercury-Wetted Relays



Contact Combination: SPDT, 1 Form C, break-before-make, Bi-Stable*

Operate Time: 3 MS average

Contact Bounce: none

Operating Position: Upright—not more than 30° from vertical

Life Expectancy: 1 Billion operations

Contacts: Mercury-wetted

Contact Load Rating: 2 amps. max. or 400 volts max. the product not to exceed 50 VA

Contact Resistance: 25 milliohms max.; less than 10% change in contact resistance through life.

Maintenance: No change in adjustment after the relay is made. May be stored indefinitely without deterioration.

Ambient Temperature:—37.8°F to +200°F.

CONSTRUCTION

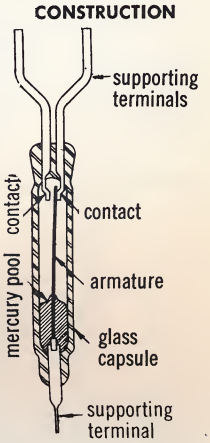
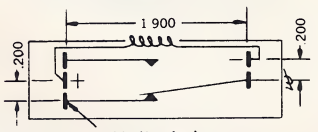


Table E—133LMPC Mercury-Wetted Relays Standard Models

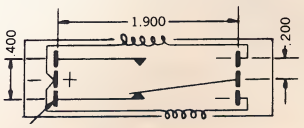
Catalog Numbers	Nomi. MADC	†Nomi. VDC	Coil Resis. OHMS	Catalog Numbers	Nomi. MADC	†Nomi. VDC	Coil Resis. OHMS
Single Wound Coils				Double Wound Coils			
133LMPCX3	40	—	70	133LMPCX8	80	—	30/30
133LMPCX4	—	6	250	133LMPCX9	—	6	120/120
133LMPCX5	—	12	1000	133LMPCX10	—	12	460/460
133LMPCX6	—	24	4000	133LMPCX11	—	24	1800/1800
133LMPCX7	4.0	—	7000	133LMPCX12	8.0	—	3000/3000

Wiring Diagrams and Terminal Pin Spacings

133LMPC Single Wound Coils



133LMPC Double Wound Coils



.062 dia. holes recommended for terminal pins in pc board.

***Bi-Stable**—Armature contact remains in the last operated position until coil polarity is reversed.

†Voltage operated relays pull in at 85% of nominal voltage

Class 133CP Mercury-Wetted Relays with Plug-in Mounting and Metal Enclosure (Single Side Stable*)

MAGNECRAFT Class 133CP designates a Single Side Stable Mercury-Wetted Contact Relay with one Form C contact combination, mounted in a metal enclosure with an 8-pin octal plug. 133CP relays combine tremendous life with stable contact resistance and contact operation completely free of bounce with the many advantages of standard plug-in mounting.

Contact Combination: SPDT, Form C, break-before-make, single side stable*

Operate Time: 2 MS average

Release Time: 2 MS average

Contacts: Mercury-wetted

Contact Load Rating: 2 amps. max. or 400 V max.; the product not to exceed 50 VA, non-inductive load

Life Expectancy: 1 billion cycles

Mounting Position: Upright—not more than 30° from vertical

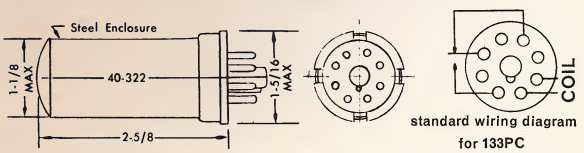
DC Power Requirements: 300 mw minimum, 2.0 watts max. continuous

DC Resistance Range: 12 to 25000 ohms standard

133CP, Form C, Standard Relays

Catalog Numbers	Nominal VDC	Must Operate MADC	Must Operate VDC	Max. VDC	Coil Resist. OHMS
133CPX1	12	38.8	5.55	16.1	130
133CPX2	24	20.0	15.4	37.4	700
133CPX3	—	10.1	27.8	70.7	2500
133CPX4	48	8.1	35.6	89.5	4000

***Single Side Stable**—Armature contact releases from the operated position when coil current falls below the drop out value.



standard wiring diagram for 133PC

Classes 102MPC and 103MPC Ultra Reliability Dry Reed Relays

Enduring high reliability and operating stability are assured in MAGNECRAFT dry reed relays by pre-adjusted contacts hermetically sealed with an atmosphere of inert gas in a glass capsule. The contacts are actuated magnetically by a coil around the capsule.

Hermetic sealing in the glass capsule protects the contacts from mechanical injury, tampering, dust, grit, moisture and other contamination; thereby assuring stable contact resistance through long life.

The MPC Modular Package (see page 35) provides stress free mounting and rigidly maintained positioning of the switch and coil, as well as excellent protection for the switch capsule, coil and terminal connections.

Important advantages:

- Hermetically sealed switching elements.
  a. Provide protection against dust, contamination and physical injury.
  b. Stabilized contact resistance.
- High speed switching. Fills the gap between relatively slow-acting electro-mechanical relays and high speed, complex and costly solid state devices.
- Sensitive operation.
- Enduring Reliability, protected by the MPC Package.
- Mechanical protection for switch capsule, coil and terminal connections.
- Magnetic shielding provided by the steel cover.
- Mounting flexibility and economy.
- Operate in any position.

COIL DATA (single wound coils*)

1. Standard operating coil voltages and currents are listed in Tables C and D. Intermediate voltages to 110 VDC are available. Standard Coil Data is listed in Table 1, below.

2. DC power requirements: nominal 500 milliwatts; minimum 150 milliwatts; maximum for continuous duty 2.00 watts.

3. DC resistance ranges; 3.0 to 7000 ohms standard.

4. Insulation to ground tested: 500 volts AC RMS Standard.

**Double Wound Coils are available.*

CONTACTS: Standard contact combinations and ratings are listed at the right.

SHOCK and VIBRATION: Withstand non-operating vibration tests of 10 to 500CPS at 10 Gs and 30 Gs of shock for 11 + 1 milliseconds duration with no mechanical damage.

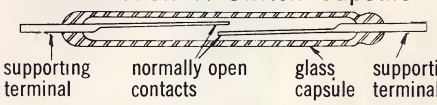
TABLE 1 STANDARD COIL DATA CHART
Class MPC and LMPC Mercury-wetted and Dry Reed Relays

Wire	Turns	Ohms	Wire	Turns	Ohms	Wire	Turns	Ohms
27	530	3	33	2000	45	39	7300	700
28	700	5	34	2450	70	40	9000	1000
29	750	7	35	3000	100	41	13300	1900
30	1000	10	36	3900	175	42	16100	3000
31	1300	19	37	4500	250	43	18500	4000
32	1750	30	38	6400	450	44	24600	7000

102MPC SPST-NO Dry Reed Relays in MPC Modular Pack

Contact Combination: SPST-NO.
Operate Time: 3 ms average
Release Time: 1/2 ms average
Nominal Power: 500 milliwatts.
Contacts: Gold: rated 15 VA at 1 amp., max. or 250 VAC max. non-inductive load.
Life Expectancy:
20 million cycles at maximum rating.
100 million cycles at ½ maximum rating.
200 million cycles at low load (1/10 amp. at 12V).
Operating Position: any position.

Construction of Switch Capsule



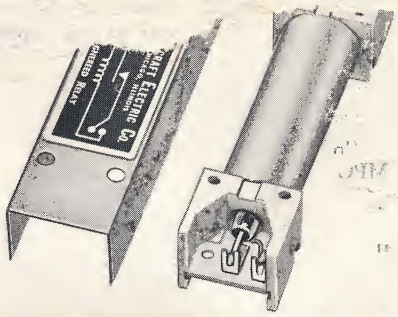


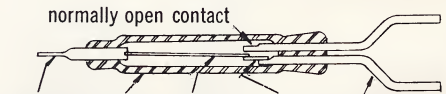
Table A—102MPC SPST-NO in STOCK for Immediate Shipment

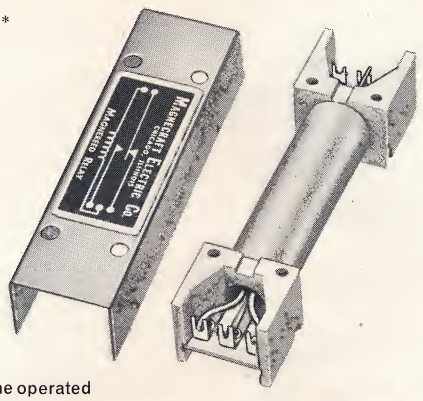
Catalog Number	COIL—DC			Catalog Number	COIL—DC		
	MA	†Volts	Ohms		MA	†Volts	Ohms
W102MPCX-5	140	—	30	W102MPCX-8	24	24VDC	1000
W102MPCX-6	85	6VDC	70	W102MPCX-9	12	48VDC	4000
W102MPCX-7	48	12VDC	250	W102MPCX-10	9	—	7000

Dimensions, page 36; wiring diagrams and terminal pin spacings, page 35

103MPC SPDT Form C Dry Reed Relays in MPC Modular Package

Contact Combination: SPDT, Form C, single side stable*
Operate Time: 2 ms average
Release Time: 1/2 ms average
Contact Bounce: 4 ms. av. on release (normally closed contact).
Nominal Power: 500 milliwatts.
Contacts: Gold—rated 10 VA at 0.5 amp. max. or 250 VAC max.; non-inductive load.
Life Expectancy:
25 million cycles at maximum rating.
50 million cycles at ½ maximum rating.
100 million cycles at low load (1/10 amp. at 12 V).





***Single Side Stable**—Armature contact releases from the operated position when coil current falls below the drop out value.

Table B—103MPC SPDT Form C in STOCK for Immediate Shipment

Catalog Number	COIL—DC			Catalog Number	COIL—DC		
	MA	†Volts	Ohms		MA	†Volts	Ohms
W103MPCX-1	140	—	30	W103MPCX-4	24	24VDC	1000
W103MPCX-2	85	6VDC	70	W103MPCX-5	12	48VDC	4000
W103MPCX-3	48	12VDC	250	W103MPCX-6	9	—	7000

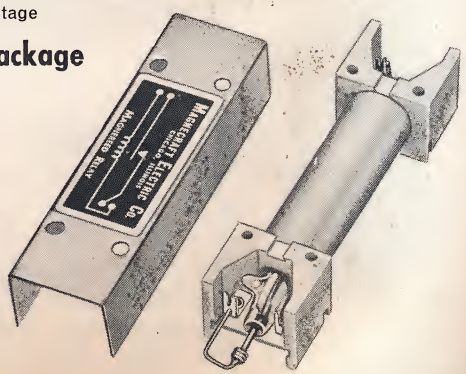
Dimensions, page 36; wiring diagrams and terminal pin spacings, page 35
†Voltage operated relays pull in at 85% of nominal voltage

Special Dry Reed Relays in MPC Package

102VMPC High Voltage Dry Reed Relays (illustrated at right). A uniquely compact relay for high voltage switching at conventional dry reed relay speed. Dependable switching of up to 5000 VDC is achieved by sealing the glass capsule with the contacts in a high vacuum atmosphere.

Power Contact Reed Relays. Hermetically sealed switch capsules used in these relays are equipped with silver alloy clad contacts as well as special contacts of other materials for power switching service up to 50 watts.

Bi-Stable Magnetic Latching Reed Relays with single wound and double wound coils. See page 39



Class 103LMPC Dry Reed Magnetic Latching (Bi-Stable*) Relays

MAGNECRAFT Class 103 LMPC Magnetic Latching Relays coil current to hold either of two latching positions. makes them ideal for memory applications.

is achieved by reversing coil

With double wou... polarized windings, switching is achieved by use of two separate inputs.

Class 103LMPC has the same Ultra Reliability design and construction as Class 102MPC and 103MPC Relays described on page 38.

The unique MPC Modular Package (see pg. 35) provides stress-free mounting, rigid positioning and mechanical protection for switch and coil.

Important advantages:

- Sensitive operation.
- Enduring Reliability, protected by the ...C Package.
- Excellent mechanical protection for switch capsule, coil and terminal connections.
- Magnetic shielding provided by the steel cover.

SINGLE WOUND COIL DATA

1. Standard operating coil currents and voltages are shown in Table F. Intermediate voltages to 110 VDC are available. Standard Coil Data is listed in Table 1, page 38.
2. DC power requirements: Nominal, 150 milliwatts. Maximum for continuous duty, 2.0 watts.
3. DC resistance range: 3.0 to 7000 ohms standard.
4. Insulation to ground tested—500 VAC RMS standard.

DOUBLE WOUND COIL DATA

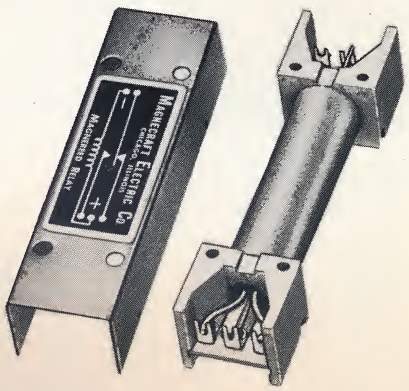
1. Standard operating coil currents and voltages are shown in Table E. Intermediate voltages to 110 VDC are available.
2. DC power requirements: Nominal, 200 milliwatts. Maximum for continuous duty, 2.0 watts.
3. DC resistance range: 3.0 to 3000 ohms standard.
4. Insulation to ground tested—500 VAC RMS standard.

CONTACTS

One Form C, break before make, standard.

103LMPC Form C, Magnetic Latching (Bi-Stable*) Dry Reed Relays

Contact Combination: SPDT, Form C, Break-before-make, Bi-Stable*
Operate Time: 2 MS average
Contact Bounce: 2 MS maximum
Operating Position: any mounting position
Life Expectancy: 25 million cycles at rated load
Contacts: Gold
Contact Load Rating: 0.2 amp. max., 200 V. max.; the product not to exceed 10 VA, non-inductive load



Construction of Switch Capsule

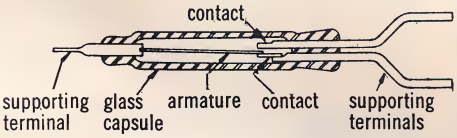
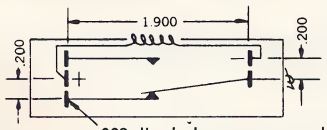


Table F—103LMPC Magnetic Latching (Bi-Stable*) Standard Relays

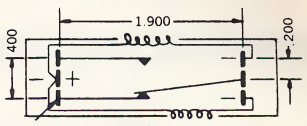
Catalog Numbers	Nom'l. MADC	Nom'l. †VDC	Coil Resis. OHMS
Single Wound Coils			
103LMPCX3	40	—	70
103LMPCX4	—	6	250
103LMPCX5	—	12	1000
103LMPCX6	—	24	4000
103LMPCX7	4.0	—	7000
Double Wound Coils			
103LMPCX8	80	—	30/30
103LMPCX9	—	6	120/120
103LMPCX10	—	12	460/460
103LMPCX11	—	24	1800/1800
103LMPCX12	8.0	—	3000/3000

Wiring Diagrams and Terminal Pin Spacings

103LMPC Single Wound Coils



103LMPC Double Wound Coils



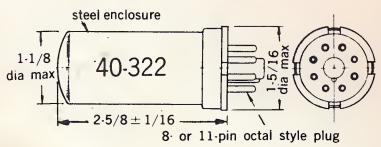
.062 dia. holes recommended for terminal pins in pc board.

***Bi-Stable**—Armature contact remains in the last operated position until coil polarity is reversed.
†Voltage operated relays pull in at 85% of nominal voltage

Class 102 and 103 Dry Reed Plug-in Relays with Metal Enclosure

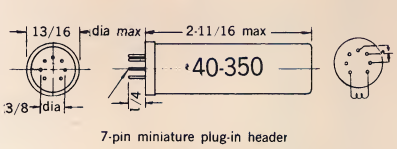
40-322—Plug-in Metal Enclosure

40-322 Enclosure: available with 8- or 11-pin Octal Plug and Class 102 or 103 Dry Reed Relays ; Pages 40 and 41.



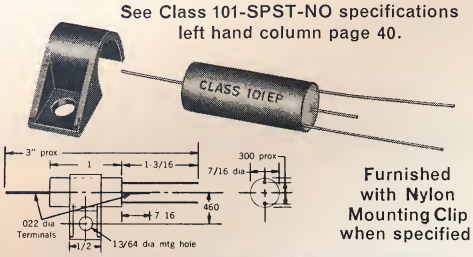
40-350—Plug-in Metal Enclosure

40-350 Enclosure with 7-pin miniature plug. Available with Class 102 or 103 Dry Reed Relays; Pages 40 and 41.



Class 101EP Axial Lead Relay

See Class 101-SPST-NO specifications left hand column page 40.



Furnished with Nylon Mounting Clip when specified.

Class 101EP Axial Lead Stock Relays

Stock Part No.	COIL MA	COIL †Volts	COIL Ohms	Nom Pwr
W101EPX-5	—	6VDC	65	600 MW
W101EPX-6	—	12VDC	225	
W101EPX-7	—	24VDC	1000	
W101EPX-8	8	—	5000	

†Voltage operated relays pull in at 85% of nominal voltage

MAGNECRAFT Open Type and Encapsulated Dry Reed Relays with PC Terminals

Enduring high reliability and operating stability are assured in MAGNECRAFT dry reed relays by pre-adjusted contacts hermetically sealed with an atmosphere of inert gas in a glass capsule. The contacts are actuated magnetically by a coil around the capsule.

Hermetic sealing in the glass capsule protects the contacts from mechanical injury, tampering, dust, grit, moisture and other contamination; thereby assuring stable contact resistance through long life.

The Epoxy Resin Encapsulated assembly (Fig. 2 and Fig. 3 at right) provides stress free mounting and rigidly maintained positioning of the switch and coil; also excellent protection for the switch capsule, coil and terminal connections.

Important advantages:

- Hermetically sealed switching elements.
  a. Provide positive protection against dust, contamination and physical injury.
  b. Maintain stabilized contact resistance.
- High speed switching. Fills the gap between relatively slow-acting electro-mechanical relays and high speed, complex and costly solid state switching devices.
- Sensitive operation.
- Enduring Reliability, protected by the epoxy resin encapsulation.
- Excellent mechanical protection for switch capsule, coil and terminal connections.
- Fast, economical circuit board plug-in assembly.
- Operate in any position.

COIL DATA

1. Standard operating coil voltages are listed in Table 2, page 41. Available for intermediate voltages to 110 volts DC.
2. Single wound or double wound coils.
3. Insulation to ground tested: 500 volts AC RMS Standard.

SHOCK and VIBRATION: Withstand non-operating vibration tests of 10 to 500CPS at 10 Gs and 30 Gs of shock for 11 + 1 milliseconds duration with no mechanical damage.

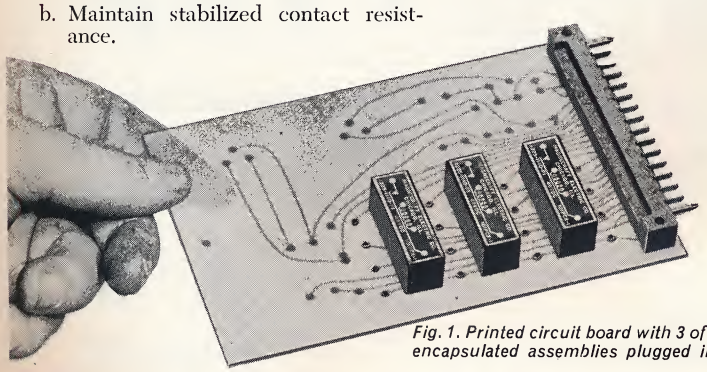


Fig. 1. Printed circuit board with 3 of 7 Class 101PC encapsulated assemblies plugged into position.

Encapsulated Relay Assemblies with Printed Circuit Plug-in Terminals.

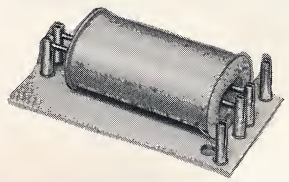
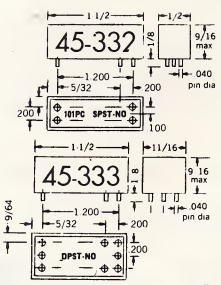


Fig. 2. 102PC assembly before encapsulation. The rugged terminal posts extend through the Epoxy board to provide the terminal pins shown in Fig. 3 below. The reed support leads are not bent but soldered to the rigid terminal posts with capsule and coil in position. The leads are not subjected to stresses that transmit to the reeds inside the capsule and disrupt adjustment stability.

Fig. 3. The 102PC Printed Circuit Relay assembly as viewed from the pin side. The pins are spaced on 0.1 grid centers (see Pin Spacing and Dimensional Diagrams, page 41), with 0.2 minimum space between terminals. Encapsulation of the assembly in Epoxy resin eliminates breakage, also protects the coil leads and terminal against mechanical injury and atmospheric change.

Class 104 SPDT Dry Reed Relays in STOCK for immediate shipment

Operate Time: 1 ms average
Release Time: 1 ms average
Contacts: Gold, rated 3VA at 0.25 amp. max. or 28 V max. non-inductive
Contact Bounce:
0.5 ms max. normally open contacts
2.0 ms max. normally closed contacts.
Life Expectancy: 10 million cycles at rated load
Operates in any position



104PC SPDT (45-332)

Stock Part No.	COIL MA	†volts	ohms	nom. pwr.
W104PCX-7	—	6VDC	65	
W104PCX-8	—	12VDC	225	600
W104PCX-9	—	24VDC	1000	MW
W104PCX-10	8	—	5000	

104PC DPDT (45-333)

Stock Part No.	COIL MA	†volts	ohms	nom. pwr.
W104PCX-3	—	6VDC	40	
W104PCX-4	—	12VDC	150	900
W104PCX-5	—	24VDC	650	MW
W104PCX-6	8	—	5000	

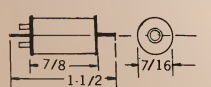
†Voltage operated relays pull in at 85% of nominal voltage

*Number in parentheses designates enclosure—see dimensional diagrams at left.

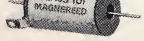
Class 101 SPST-NO Dry Reed Relays in STOCK for Immediate Shipment

Operate Time: 1 ms average
Release Time: 1/2 ms average
Contacts: Gold, rated 12VA at .250 amp. max. or 100 VAC max. non-inductive
Life Expectancy:
5 million cycles at max. rating
20 million cycles at ½ max. rating.
Operates in any position

Capacitance between contacts: .3 mmf**

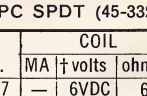


***nominal value for open style reed relays*



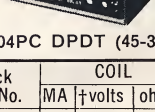
101-SPST-NO open type

catalog number	COIL MA	†volts	ohms	nom. pwr.
W101X-1	46	6VDC	100	
W101X-2	30	12VDC	250	600
W101X-3	20	24VDC	500	MW
W101X-4	9	—	2500	



101PC SPST-NO (45-321)*

catalog number	COIL MA	† volts	ohms	nom. pwr.
W101PCX-5	—	6VDC	65	
W101PCX-6	—	12VDC	250	600
W101PCX-7	—	24VDC	1000	MW
W101PCX-8	8	—	5000	



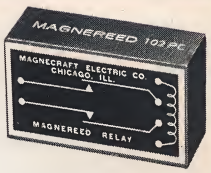
101PC DPST-NO (45-322)*

catalog number	COIL MA	† volts	ohms	nom. pwr.
W101PCX-9	—	6VDC	40	
W101PCX-10	—	12VDC	150	900
W101PCX-11	—	24VDC	650	MW
W101PCX-12	8	—	5000	

*Number in parentheses designates enclosure—see dimensional diagrams page 41.

Class 102 SPST-NO Dry Reed Relays in STOCK for Immediate Shipment

Operate Time: 3 ms average
Release Time: 1/2 ms average
Contacts: Gold—rated 15VA at 1 amp. max



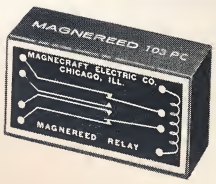
T-NO (45-324)*

COIL		nom.
† volts	ohms	pwr.
6VDC	100	
12VDC	400	400
24VDC	1500	MW
—	5000	

102PC DPST-NO (45-326)*

catalog number	COIL			nom.
	MA	† volts	ohms	pwr.
W102PCX-5	—	6VDC	50	
W102PCX-6	—	12VDC	200	700
W102PCX-7	—	24VDC	800	MW
W102PCX-8	9	—	5000	

or Immediate Shipment



orm C (45-325)*

COIL		nom.
† volts	ohms	pwr.
6VDC	100	
12VDC	400	400
24VDC	1500	MW
—	5000	

103PC DPDT-2-form C (45-327)*

catalog number	COIL			nom.
	MA	† volts	ohms	pwr.
W103PCX-5	—	6VDC	50	
W103PCX-6	—	12VDC	200	700
W103PCX-7	—	24VDC	800	MW
W103PCX-8	9	—	5000	

mensional diagrams below.
age

TABLE 2—Standard Coil Data for Dry Reed Relays

	101 open type SPST-NO		101PC—C-45-321 SPST-NO		101PC-45-322 DPST-NO	
Wire	Ohms*	Turns	Ohms*	Turns	Ohms*	Turns
27	1.5	380	1.0	270	1.0	185
28	2.0	400	1.5	320	2.0	240
29	3.0	500	2.5	410	3.0	300
30	5.5	680	4.0	500	4.0	370
31	9.5	900	7.0	600	7.0	500
32	14	1150	10	800	11	600
33	22	1300	15	1000	17	760
34	36	1700	25	1300	27	970
35	60	2200	40	1700	40	1150
36	90	2750	65	2000	70	1520
37	100	2650	100	2700	100	1860
38	225	4500	160	3300	150	2150
39	250	4130	250	4100	290	3170
40	500	6200	450	5700	475	4130
41	1000	9200	625	6500	650	4700
42	1600	11300	1000	8000	1100	6050
43	2500	14700	1700	10600	1800	7780
44	4000	19000	2500	13000	2800	10100

	102 SPST-NO 103 SPDT open		102PC SPST-NO 103PC SPDT 45-324	45-325	102PC DPST-NO 103PC DPDT 45-326	45-327
Wire	Ohms*	Turns	Ohms*	Turns	Ohms*	Turns
27	4	920	2.3	460	6	800
28	7	1060	3.5	560	10	1030
29	11	1400	5.5	710	16	1300
30	18	1700	9.0	870	25	1640
31	30	2300	13	1060	40	2100
32	45	2760	23	1400	50	2040
33	70	3280	30	1750	90	3100
34	100	4000	50	2000	150	3900
35	175	5190	90	2800	200	4400
36	200	5300	100	2600	400	6560
37	450	8400	200	4000	625	8200
38	500	8400	340	5620	800	8000
39	1200	14600	400	5300	1750	13300
40	2000	18000	1000	9600	2900	17300
41	3200	23400	1500	12000	4500	21000
42	4300	25200	2400	14500	5000	21200
43	5000	26000	3700	17700	10000	32500
44	10000	41000	5000	20500	15000	41600

*Plus or Minus 10% at 25° C.

W103CPX-14	10	—	5000

†Voltage operated relays pull in at 85% of nominal voltage

WD-2 DPDT, 8-pin WD-3 3PDT, 11-pin

MAGNECRAFT Open Type and Encapsulated Dry Reed Relays with PC Terminals

Enduring high reliability and operating stability are assured in MAGNECRAFT dry reed relays by pre-adjusted contacts hermetically sealed with an atmosphere of inert gas in a glass capsule. The contacts are actuated magnetically by a coil around the capsule.

Hermetic sealing in the glass capsule protects the contacts from mechanical injury, tampering, dust, grit, moisture and other contamination; thereby assuring stable contact resistance through long life.

The Epoxy Resin Encapsulated assembly (Fig. 2 and Fig. 3 at right) provides stress free mounting and rigidly maintained positioning of the switch and coil; also excellent protection for the switch capsule, coil and terminal connections.

Important advantages:

- Hermetically sealed switching elements.
  a. Provide positive protection against dust, contamination and physical injury.
  b. Maintain stabilized contact resistance.
- High speed switching. Fills the gap between relatively slow-acting electro-

3. Insulation to ground tested: 500 volts AC RMS Standard.

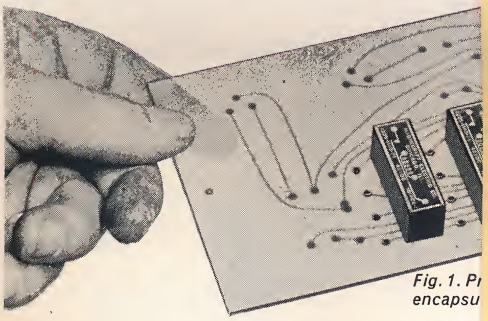


Fig. 1. Pr
encapsu

Class 104 SPDT Dr

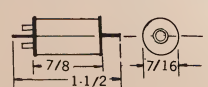
Operate Time: 1 ms average
Release Time: 1 ms average
Contacts: Gold, rated 3VA at 0.25 amp. max. or 28 V max. non-inductive
Contact Bounce:
0.5 ms max. normally open contacts
2.0 ms max. normally closed contacts.
Life Expectancy: 10 million cycles at rated load
Operates in any position

†Voltage operated relays pull in at 85% of nominal v

Class 101 SPST-NO Dry

Operate Time: 1 ms average
Release Time: 1/2 ms average
Contacts: Gold, rated 12VA at .250 amp. max. or 100 VAC max. non-inductive
Life Expectancy:
5 million cycles at max. rating
20 million cycles at ½ max. rating.
Operates in any position

Capacitance between contacts: .3 mmf**



**nominal value for open style reed relays

10

catalog number															
W101X-1						W101PCX-5	—	24VDC	1000	MW	W101PCX-9	—	24VDC	650	MW
W101X-2						W101PCX-6	—	—	5000		W101PCX-10	—	—	5000	
W101X-3	20	24VDC	500	MW		W101PCX-7	—	24VDC	1000	MW	W101PCX-11	—	24VDC	650	MW
W101X-4	9	—	2500			W101PCX-8	8	—	5000		W101PCX-12	8	—	5000	

*Number in parentheses designates enclosure—see dimensional diagrams page 41.

RELAY APPLICATION FORM

Check List of information for ordering Relays and for requesting Application Recommendations. Fill in applicable data.

Company _____ Date _____

Address _____

Individual _____ Title _____

Company Part No. _____ Company Ref. No. _____

Type of: Magnecraft Class Relay : or Type of other make _____

Contact Combination _____ Contact load volts _____ Contact load amps. _____

Type of Contact Load: (Resistive, inductive, etc.) _____

Required Life _____

Nominal Coil voltage or current _____ Pull-in voltage or current _____

Drop-out voltage or current (if applicable) _____ DC Ohms Resist. _____

Ambient Temperature _____ Duty : Continuous ☐ Cycle: Intermittent ☐

Operate Time _____ Release Time _____

TERMINALS Plug-in ☐ Printed Circuit ☐ Solder ☐ Taper Tab. ☐ Other ☐

ENCLOSURE Hermetically Sealed Enc. No. _____ Dust Cover Enc. No. _____

Type and maximum dimensions of enclosure if not standard _____

Applicable MIL. SPECS. _____

Quantity Required _____

Special Features _____

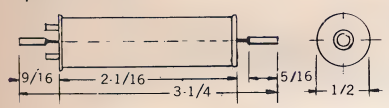
Send to MAGNECRAFT ELECTRIC CO.,
5575 North Lynch Avenue, Chicago, Ill. 60630

Cut on this line

Class 102 SPST-NO Dry Reed Relays in STOCK for Immediate Shipment

Operate Time: 3 ms average
Release Time: 1/2 ms average
Contacts: Gold—rated 15VA at 1 amp. max. or 250 VAC max. non-inductive
Life Expectancy:
20 million cycles at max. rating
100 million cycles at ½ max. rating
Operates in any position

Capacitance between contacts: .9 mmf**



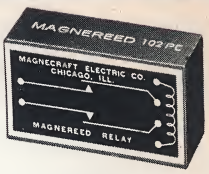
**nominal value for open style reed relays

102 SPST-NO open type

catalog number	COIL MA	† volts	ohms	nom. pwr.
W102X-1	32	—	100	
W102X-2	23	6VDC	200	300
W102X-3	14.5	12VDC	500	MW
W102X-4	7.5	24VDC	2000	
W102X-5	4.6	—	5000	

102PC SPST-NO (45-324)*

catalog number	COIL MA	† volts	ohms	nom. pwr.
W102PCX-1	—	6VDC	100	
W102PCX-2	—	12VDC	400	400
W102PCX-3	—	24VDC	1500	MW
W102PCX-4	6.5	—	5000	



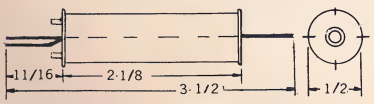
102PC DPST-NO (45-326)*

catalog number	COIL MA	† volts	ohms	nom. pwr.
W102PCX-5	—	6VDC	50	
W102PCX-6	—	12VDC	200	700
W102PCX-7	—	24VDC	800	MW
W102PCX-8	9	—	5000	

Class 103 SPDT, Form C, Dry Reed Relays in STOCK for Immediate Shipment

Contact Combination: SPDT Form C break-before-make (Single Side Stable)*
Operate Time: 2 ms average
Release Time: 1/2 ms average
Contacts: Gold—rated 10VA at 1 amp max. or 250 VAC max. non-inductive
Contact Bounce: 4 ms average on release (normally closed contacts)
Life Expectancy:
25 million cycles at max. rating
50 million cycles at ½ max. rating
100 million cycles at low load rating.

Capacitance between contacts: .8 mmf**



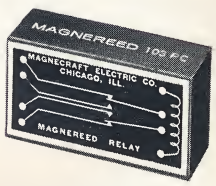
**nominal value for open style reed

103 SPDT form C open type

catalog number	COIL MA	† volts	ohms	nom. pwr.
W103X-8	32	—	100	
W103X-9	23	6VDC	200	300
W103X-10	14.5	12VDC	500	MW
W103X-11	7.5	24VDC	2000	
W103X-12	4.6	—	5000	

103PC SPDT-form C (45-325)*

catalog number	COIL MA	† volts	ohms	nom. pwr.
W103PCX-1	—	6VDC	100	
W103PCX-2	—	12VDC	400	400
W103PCX-3	—	24VDC	1500	MW
W103PCX-4	6.5	—	5000	



103PC DPDT-2-form C (45-327)*

catalog number	COIL MA	† volts	ohms	nom. pwr.
W103PCX-5	—	6VDC	50	
W103PCX-6	—	12VDC	200	700
W103PCX-7	—	24VDC	800	MW
W103PCX-8	9	—	5000	

*Number in parentheses designates enclosure—see dimensional diagrams below.
†Voltage operated relays pull in at 85% of nominal voltage

Dimensions and Pin Spacing of Encapsulated Dry Reed Relay Assemblies

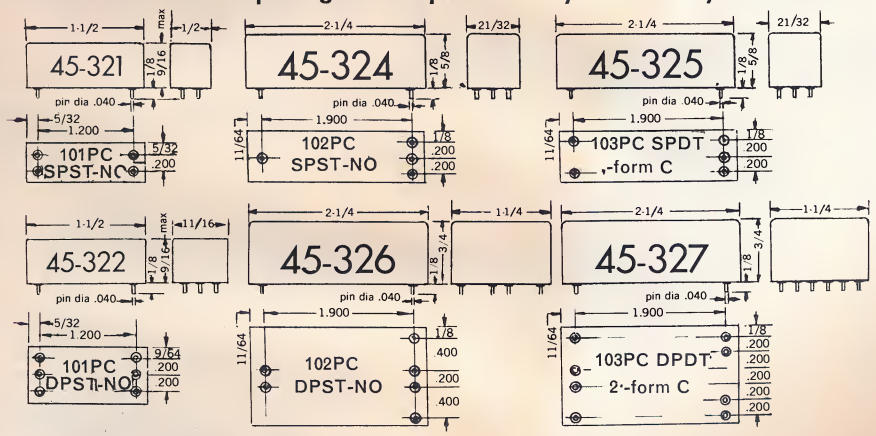


TABLE 2—Standard Coil Data for Dry Reed Relays

	101 open type SPST-NO		101PC—C-45-321 SPST-NO		101PC-45-322 DPST-NO	
Wire	Ohms*	Turns	Ohms*	Turns	Ohms*	Turns
27	1.5	380	1.0	270	1.0	185
28	2.0	400	1.5	320	2.0	240
29	3.0	500	2.5	410	3.0	300
30	5.5	680	4.0	500	4.0	370
31	9.5	900	7.0	600	7.0	500
32	14	1150	10	800	11	600
33	22	1300	15	1000	17	760
34	36	1700	25	1300	27	970
35	60	2200	40	1700	40	1150
36	90	2750	65	2000	70	1520
37	100	2650	100	2700	100	1860
38	225	4500	160	3300	150	2150
39	250	4130	250	4100	290	3170
40	500	6200	450	5700	475	4130
41	1000	9200	625	6500	650	4700
42	1600	11300	1000	8000	1100	6050
43	2500	14700	1700	10600	1800	7780
44	4000	19000	2500	13000	2800	10100

103CP Dry Reed Relays, plug-in mounted in plastic dust cover

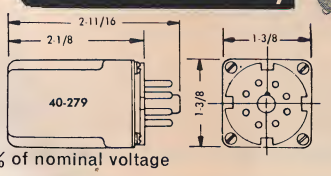
Each assembly unit includes two or three Class 103, SPDT, Form C Relays —see specifications under Class 103 at top of this page—with plug-in mounting in polystyrene dust cover, and 8 or 11-pin octal style plug.

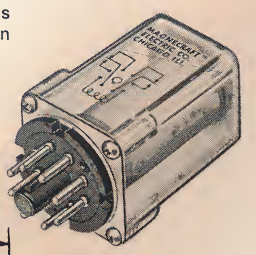
CONTACTS: SPDT, Form C, break-before make, single side stable*
**Single Side Stable*—Armature contact releases from the operated position when coil current falls below the dropout value.

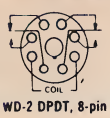
catalog number	contacts	COIL MA	† volts	ohms
W103CPX-7		—	6VDC	75
W103CPX-8	DPDT	—	12VDC	300
W103CPX-9	WD-2	—	24VDC	1000
W103CPX-10		8	—	5000
W103CPX-11		—	6VDC	40
W103CPX-12	3PDT	—	12VDC	150
W103CPX-13	WD-3	—	24VDC	650
W103CPX-14		10	—	5000

†Voltage operated relays pull in at 85% of nominal voltage

103CP Relays in Stock for Immediate Delivery







WD-2 DPDT, 8-pin

WD-3 3PDT, 11-pin

	102 SPST-NO 103 SPDT open		102PC SPST-NO 103PC SPDT 45-324		102PC DPST-NO 103PC DPDT 45-326	45-327
Wire	Ohms*	Turns	Ohms*	Turns	Ohms*	Turns
27	4	920	2.3	460	6	800
28	7	1060	3.5	560	10	1030
29	11	1400	5.5	710	16	1300
30	18	1700	9.0	870	25	1640
31	30	2300	13	1060	40	2100
32	45	2760	23	1400	50	2040
33	70	3280	30	1750	90	3100
34	100	4000	50	2000	150	3900
35	175	5190	90	2800	200	4400
36	200	5300	100	2600	400	6560
37	450	8400	200	4000	625	8200
38	500	8400	340	5620	800	8000
39	1200	14600	400	5300	1750	13300
40	2000	18000	1000	9600	2900	17300
41	3200	23400	1500	12000	4500	21000
42	4300	25200	2400	14500	5000	21200
43	5000	26000	3700	17700	10000	32500
44	10000	41000	5000	20500	15000	41600

*Plus or Minus 10% at 25° C.

Operate Time Delay adjustable 0.2 to 30 sec.

The new MAGNECRAFT Class 110 Relay has been developed to provide, in a small, inexpensive Time Delay Relay, the high reliability and the great life users have learned to expect from MAGNECRAFT Relays.

In this unique development, **proven high reliability relay contacts and switching mechanism are merged with a precision-built air dashpot timer.** The result is a masterpiece of simplicity and a minimum number of moving parts that sets new standards of compactness and long life reliability.

The Air Dashpot Timer is built of **non-aging inert materials** to provide the last word in reliability through long life. The cylinder is tempered glass, precision ground to dimensions and polished for lowest friction. The precision fitted piston is of dimensionally stable, low friction graphite. All metal parts are corrosion resistant.

The Solenoid Assembly is unique; a new patent-applied-for invention. When the operating coil is energized the Solenoid pulls out the dashpot piston at the rate for which the timing adjustment is set. Through the timing period, the relay contacts remain in the de-energized (normal) position, **completely free from any tendency to make premature or faltering contact.**

At the end of the timing period (when the Dashpot piston travel is complete) the Solenoid Plunger **instantaneously** completes the magnetic circuit which **snaps in** the Relay Contacts and **holds them under full magnetic power until the coil is de-energized.**

When the coil is de-energized relay contact dropout is **instantaneous and positive;** the Solenoid Plunger Spring helps the relay release spring snap the contacts to the de-energized position.

COIL DATA

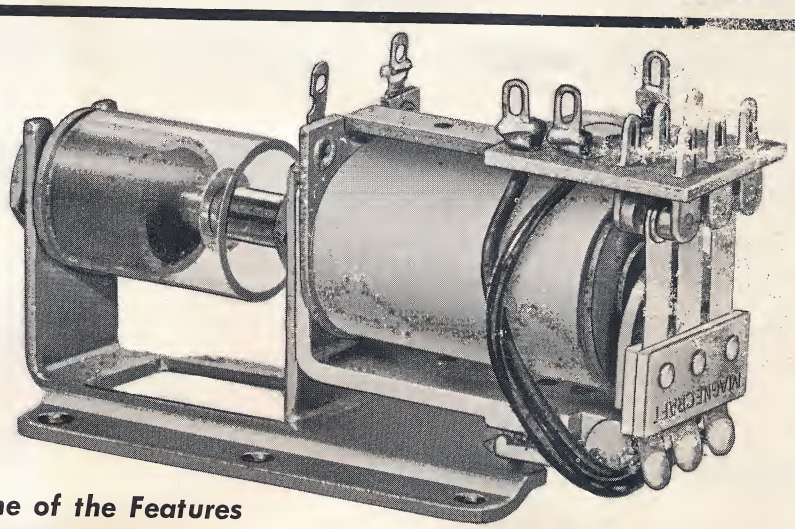
1. Standard operating voltages are listed in tables. Available for intermediate and higher operating voltages up to 110 VDC and 115 VAC. Relays for AC operation are equipped with built-in diode rectification.

2. DC Power Requirements: Nominal, 4 watts.

3. AC nominal volt-ampere requirements, 7 VA.

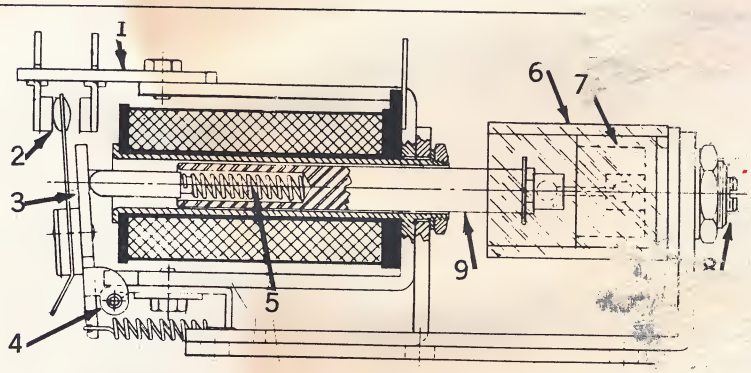
4. Insulation to ground tested at 750 volts AC RMS as standard.

5. Standard insulation—fiber glass melamine—tested at 750 volts AC RMS, for breakdown to ground.

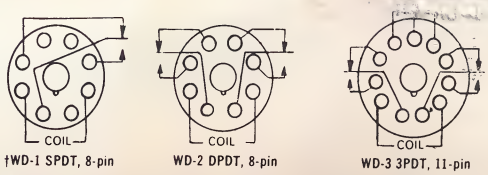


Some of the Features

1. **High Reliability through long life:**
   a. Proven high reliability relay contacts and switching mechanism.
   b. Precision-built Air Dashpot of inert, non-aging, low friction materials.
   c. Solenoid assembly completes magnetic circuit instantaneously for positive switching action; protects contacts from chattering and frying.
   d. All metal parts protected from corrosion.
   e. Extreme simplicity — few moving parts; none subjected to distortion.
2. **0.2 to 30 seconds Timing Adjustment with a single screw.**
3. **Instantaneous release.** Air D... reaches "start" second.
4. **Operate.** be set in ... position.
5. **Timing Repeat Accuracy ± 10%.**
6. **Temperature Range, —65 to +165°F.**
7. **AC and DC operation.** *AC models rectified for DC reliability ... service.
8. **Low Power Co...** AC, 7 volt amperes.



1. Terminal Board.
2. Heavy Duty Relay Contacts have built-in contact wipe.
3. Ruggedized relay armature.
4. Pin type armature hinge. The same precision built hinge used in the finest telephone type relays.
5. Compression Spring—Compresses when solenoid pulls out dashpot piston: when coil is de-energized, helps snap contacts to normal position and returns piston to start position.
6. Air Dashpot Cylinder—Specially treated glass, precision ground and polished
7. Graphite Piston— ... solenoid plunger ... ing adjustment.
8. Timing adjustment ... stepless adjustment fro... seconds. *Self-locking.*
9. Solenoid Plunger—W... coil is energized the plunger pulls out dashpot piston; at end of travel the plunger instantaneously completes magnetic circuit that pulls in contact... tains full con... de-energi...



†WD-1 SPDT, 8-pin | WD-2 DPDT, 8-pin | WD-3 3PDT, 11-pin

Wiring Diagrams for 10-amp. with 40-347 Plug-in Cover — Tab... I

Class 110 Relays with 10-amp Contacts—0.2 to 30 sec. Operate Delay Timing Range

Standard Relays listed on this page have MAGNECRAFT Code 120, .187" diameter silver cadmium oxide gold flashed heavy duty contacts rated 10 amperes at 115 VAC or 32 VDC non-inductive load. Variations available on relays built to order.

10-amp. open type Solder Terminals

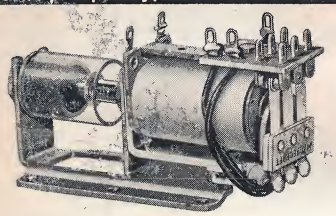
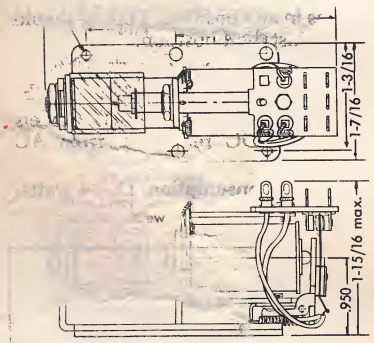


Table I--10-amp., open type

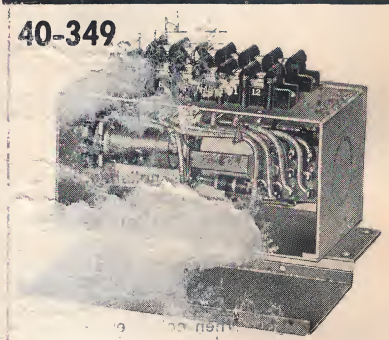
†Coil Voltage	CATALOG NUMBERS SPDT	DPDT	3PDT
6VDC	110X-3	110X-7	110X-11
12VDC	110X-4	110X-8	110X-12
24VDC	110X-5	*W110X-9	110X-13
110VDC	110X-6	*W110X-10	110X-14
		0AX-4	110AX-7
		AX-9	110AX-8



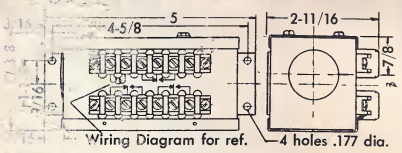
*W prefix indicates STOCK relay available for immediate shipment.

10-amp. 3PDT with 40-349 Dust Cover

40-349

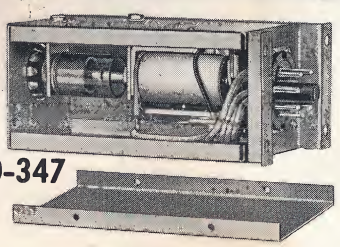


40-349 heavy duty metal enclosure with molded phenolic barrier, screw type terminal blocks and snap-on cover housing Air Dashpot provides timing adjustment. For catalog numbers see Table III above.



Voltage operated relays pull in at 85% of nominal voltage

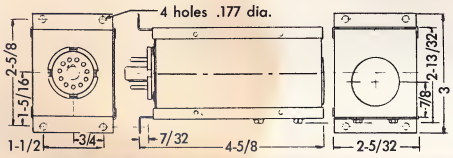
10-amp. with 40-347 Plug-in Cover



Class 110 Air Dashpot Time Delay Relay with 10-ampere contacts in heavy duty metal enclosure 40-347 with octal phenolic plug-in base, hold down bracket and snap-on cover. Snap-on cap affords convenient access to timing screw.

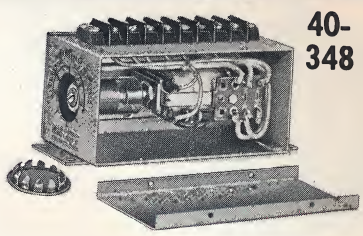
Table II—10-amp. with 40-347 Plug-in

†Coil voltage	CATALOG NUMBERS SPDT 8-pin WD-1	DPDT 8-pin WD-2	3PDT 11-pin WD-3
6VDC	110CPX-3	110CPX-8	110CPX-13
12VDC	110CPX-4	110CPX-9	110CPX-14
24VDC	110CPX-5	*W110CPX-10	110CPX-15
110VDC	110CPX-6	*W110CPX-11	110CPX-16
24VAC	110ACPX-1	110ACPX-4	110ACPX-7
115VAC	110ACPX-2	*W110ACPX-9	110ACPX-8



10-amp. with 40-348 40-349 Covers

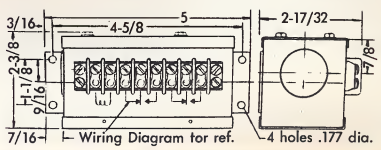
40-348



Class 110 Air Dashpot Time Delay Relay with 10-ampere contacts in heavy duty metal enclosures **40-348**, SPDT and DPDT, and **40-349** 3PDT. These enclosures have molded phenolic barrier screw type terminal blocks and snap-on cover. Snap-on cap provides timing access

Table III—10-amp. with 40-348/40-349

†Coil voltage	CATALOG NUMBERS Enclosure 40-348 SPDT	DPDT	Enc. 40-349 3PDT
6VDC	110CSX-3	110CSX-7	110CSX-9
12VDC	110CSX-4	110CSX-8	110CSX-10
24VDC	110CSX-5	*W110CSX-1	110CSX-11
110VDC	110CSX-6	*W110CSX-2	110CSX-12
24 VAC	110ACSX-2	110ACSX-5	110ACSX-7
115VAC	110ACSX-3	*W110ACSX-1	110ACSX-8



With Hermetically Sealed or Dust Tight Enclosures

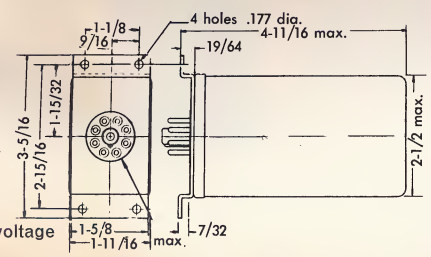
40-352 with Class 110

Hermetically sealed units have **operate time delay factory set to specifications.**

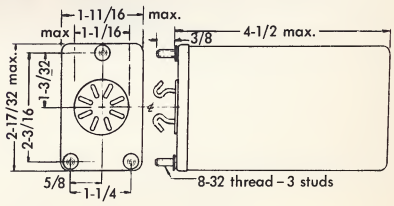
40-353 with Class 110

Units in dust tight enclosures have **operate delay adjustment from 0.2 to 30 seconds.**

40-352 enclosure with octal plug-in header, available hermetically sealed or dust tight with Class 110 Time Delay Relay, 10-ampere, SPDT, DPDT and 3PDT contacts. SPDT and DPDT relays have 8-pin headers; 3PDT relays have 11-pin headers.

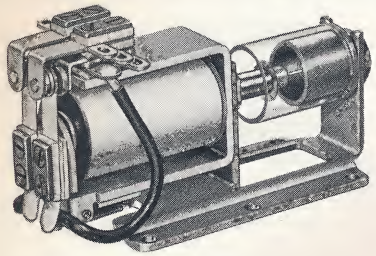


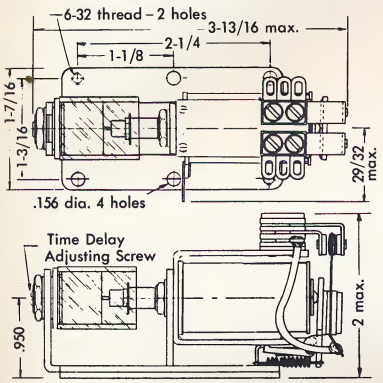
40-353 enclosure with solder terminal, glass to metal header, available hermetically sealed or dust tight with Class 110 Time Delay Relay, 10-ampere, SPDT, DPDT and 3PDT contacts. Available with up to 14 solder terminal pins.



Class 110R Air Dashpot Time Delay Relay with 15-ampere DPDT Contacts

Open type -15-amp. DPDT Contacts





Operate Time Delay adjustable 0.2 to 30 seconds

Equipped with MAGNECRAFT Code **121**, individually riveted, .250" diameter silver cadmium oxide (gold flashed) heavy duty contacts rated 15 amperes at 115 VAC or 32 VDC resistive load. Contacts and terminals are especially rugged to withstand heavy duty industrial service.

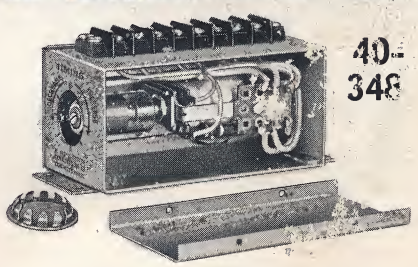
Table IV—15-amp. DPDT Contacts

†Coil voltage	CATALOG NUMBERS Open with Sold. Term.	with enc. 40-348
24 VDC	110RX-1	110RCSX-1
110 VDC	110RX-2	110RCSX-2
115 VAC	110ARX-1	110ARCSX-1

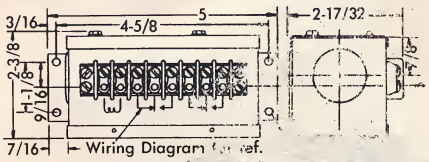
†Voltage operated relays pull in at 85% of nominal voltage

Relays listed are standard. Special relays can be furnished to specifications.

15-amp. DPDT with 40-348 Dust Cover

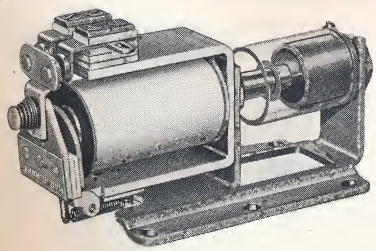


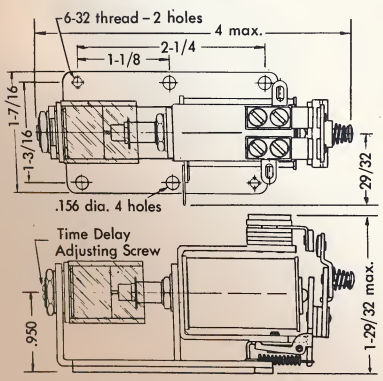
40-348 heavy duty metal enclosure with molded phenolic barrier screw type terminal block and snap-on cover housing **Class 110R 15-amp. DPDT Time Delay Relay.** Snap-on cap provides convenient access to timing screw. See listing in Table IV.



Class 110D Air Dashpot Time Delay Relay with 50 amp. SPST-DB-NO Contacts

Open type—50-amp., SPST-NO-DB





Operate Time Delay adjustable 0.2 to 30 seconds

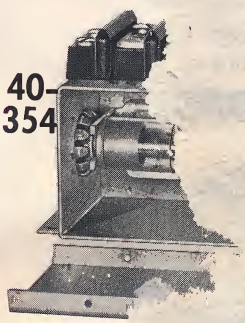
Equipped with MAGNECRAFT Code **122**, individually riveted, .250" diameter silver cadmium oxide (gold flashed) power switching contacts, rated 50 amperes at 115 VAC or 32 VDC, resistive load. The big amperage contacts provide direct switching of heavy loads in small space without the use of slave relays. A unique feature of this relay is a special contact structure that provides positive wiping action combined with double break.

Table V–50-amp. SPST-NO-DB Contacts

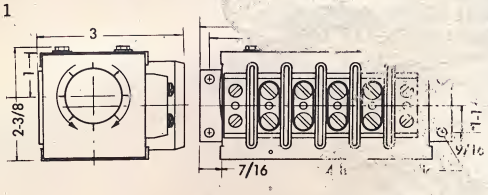
†Coil Voltage	CATALOG NUMBERS Open with Sold. Term.	with enc. 40-354
24 VDC	110DX-1	110DCSX-1
110 VDC	110DX-2	110DCSX-2
115 VAC	110ADX-1	110ADCSX-1

†Voltage operated relays pull in at 85% of nominal voltage

50-amp. SPST-NO-DB with 40-354 Dust Cover



40-354 heavy duty molded phenolic barrier screw type terminal block and snap-on cover housing **Class 110D 50-amp. SPST-NO-DB** Time Delay Relay. Snap-on cap provides convenient access to timing screw. See listing in Table V.



Class 110 Air Dashpot Time Delay Relays can be furnished with many custom-built features. Send requirement specifications for recommendations.

40-346 Dust Cover enclosure for Class 110 Relays

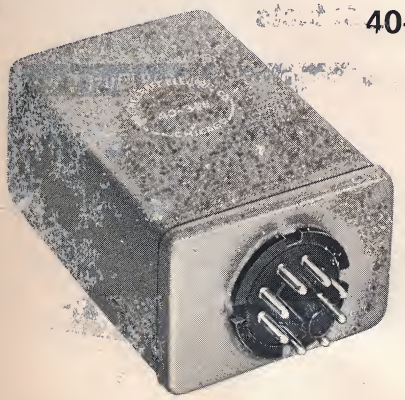
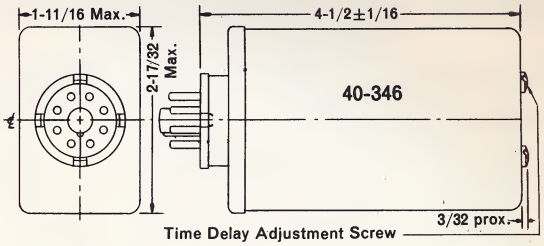


Table VI-Class 110 Relays 10-ampere DPDT Contacts Enclosure 40-346

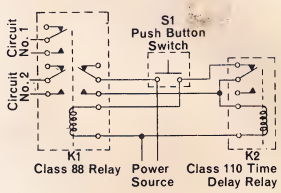
†Coil Volts	Catalog Number
115VAC	110ACPX-18
24VDC	110CPX-19



Dust tight enclosure Available with 8- or 11-pin phenolic plug (mate Amphenol Socket 77-MIP-8, -11 or equivalent) for Class 110 Relays with SPDT, DPDT and 3PDT Contacts.

Class 110 Relay Assembly for Adjustable Output Time with Variable Input Time

This assembly is designed to provide output pulses adjustable from ½ to 30 seconds, unaffected by variations of input time from 25 milliseconds to duration of output pulse. Circuit Diagram No. 40-1465 at the right shows [illegible] assemblies [illegible] to your specifi-



[illegible]8 Relay) closes the normally open right [illegible] K2 (Time Delay Relay) and also [illegible]ugh the K2 normally closed [illegible]nuous energizing of the K1 with e[illegible] continuous pulse. When the Delay [illegible] K2 Relay energizes which de-[illegible]rgizes the K1 [illegible]n turn de-energizes the K2 Relay. [illegible] Clas[illegible] Delay Relay may be used in the above

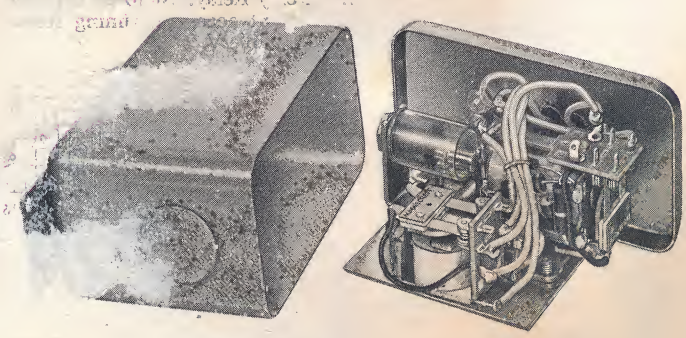
[illegible]tandard Relays [illegible] Output/ Variable Input Assemblies

[illegible]s	CATALOG NUMBERS* Class 88 Relays SPDT	DPDT
[illegible]0X-3	*W88X-6	*W88X-10
[illegible]0X-4	*W88X-7	*W88X-11
110X-5	*W88X-8	*W88X-12
110X-6	*W88X-9	*W88X-13
[illegible]0AX-[illegible]	*W88AX-7	*W88AX-11
	*W88AX-8	*W88AX-12

[illegible]t 85% of nominal voltage

[illegible]ay; available for immediate shipment

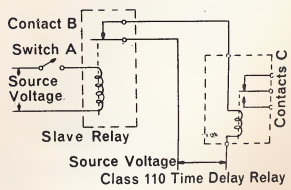
[illegible]ure for Class 110 and Auxiliary Relay



Available with Release Delay Assemblies shown in Circuit Diagram 41-1465 and Adjustable Output/variable Input Assemblies shown in Circuit Diagram 41-1466.

Class 110 Release Delay Assembly

To provide Release Time Delay, MAGNECRAFT Class 110 Time Delay Relays may be wired with a Class 88 Relay (see page 6) in accordance with circuit diagram No. 41-1465 at the right. Complete assemblies can be furnished to your specifications.



When the Slave Relay coil is energized, Contact B (normally closed) opens causing the Class 110 Time Delay to de-energize instantaneously. When the Slave Relay coil is de-energized Contact B closes which causes the Time Delay Relay to operate at expiration of Timing Period.

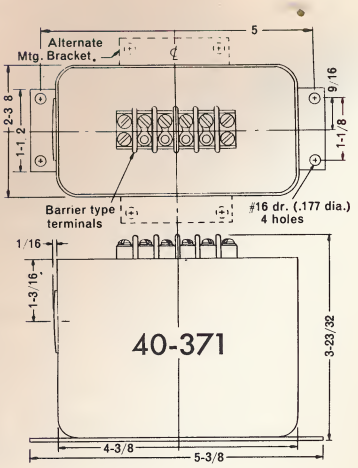
Any class 110 Time Delay Relay can be used in this circuit.

Table VIII —Combinations of Standard Relays for RELEASE Time Delay Operation.

†Coil Volts	CATALOG NUMBERS* Class 110 Relay SPDT	DPDT	3PDT	Class 88
6VDC	110X-3	110X-7	110X-11	*W88X-2
12VDC	110X-4	110X-8	110X-12	*W88X-3
24VDC	110X-5	*W110X-9	110X-13	*W88X-4
110VDC	110X-6	*W110X-10	110X-14	*W88X-5
24VAC	110AX-1	110AX-4	110AX-7	*W88AX-3
115VAC	110AX-2	*W110AX-9	110AX-8	*W88AX-4

†Voltage operated relays pull in at 85% of nominal voltage

*W prefix indicates STOCK relays; available for immediate shipment



MAGNECRAFT Coaxial Relays for UHF Switching

Magnecraft Coaxial Relays have been developed especially to meet today's exacting demands for reliable Ultra High Frequency Switching through Coaxial Cable in small size and at low cost.

The gold plated, heavy silver cadmium oxide contacts are supported directly from the cable connectors for extremely low loss at very high frequencies.

The entire single pole, double throw contact structure is housed in a heavy duty die cast enclosure. A removable side plate provides for ready inspection of internal contacts.

FEATURES

1. Low VSWR through the Ultra High Frequencies
2. Excellent cross talk characteristics
3. Wide selection of connectors
4. Fast operation
5. Long Life—one million cycles, minimum
6. Low Wattage operating coils
7. High Reliability in Small Size at Low Cost

ELECTRICAL SPECIFICATIONS

1. Contact Combination—Single Pole, Double Throw
2. Contact Rating—for antenna transfer—150 watts RF maximum up to 470 megacycles
3. Initial Contact Resistance—.05 ohms maximum
4. VSWR (voltage standing wave ratio)—1.25/1 maximum from 0 to 470 megacycles
5. Cross Talk—40 DB minimum from 0 to 470 megacycles
6. Dielectric Strength—1000 volts RMS at sea level
7. Insulation Resistance—1000 megohms minimum
8. Operate Time—15 milliseconds maximum at nominal coil voltage available when specified
9. Release Time—7 milliseconds maximum at nominal coil voltage at 25° when specified
10. Ambient Temperature —55° to +125° C. Insulation and coils for higher temperature rating furnished when specified

MECHANICAL SPECIFICATIONS

1. Enclosure—Contacts closed [illegible] with removable side plate for convenient inspection of contacts
2. Terminals—Coaxial cable with inner and outer conductors stripped ½ inch. Other terminations with coaxial cable furnished as specified
3. Coaxial Cable—Coaxial cable cavity has [illegible] and can be specified

RG58A/U is standard. Other cables can be supplied provided the outside diameter does not exceed RG58A/U and the inner conductor will pass through a .032 diameter hole.

Class 120 Coaxial Relays for Minimum Space and Weight

A Class 120 Coaxial Relay consists of the MAGNECRAFT standard Coaxial cavity integrally assembled to a Class 33 Relay basic structure (see page 14). The Class 120 is ideally suited for applications where space and weight must be kept to a minimum.

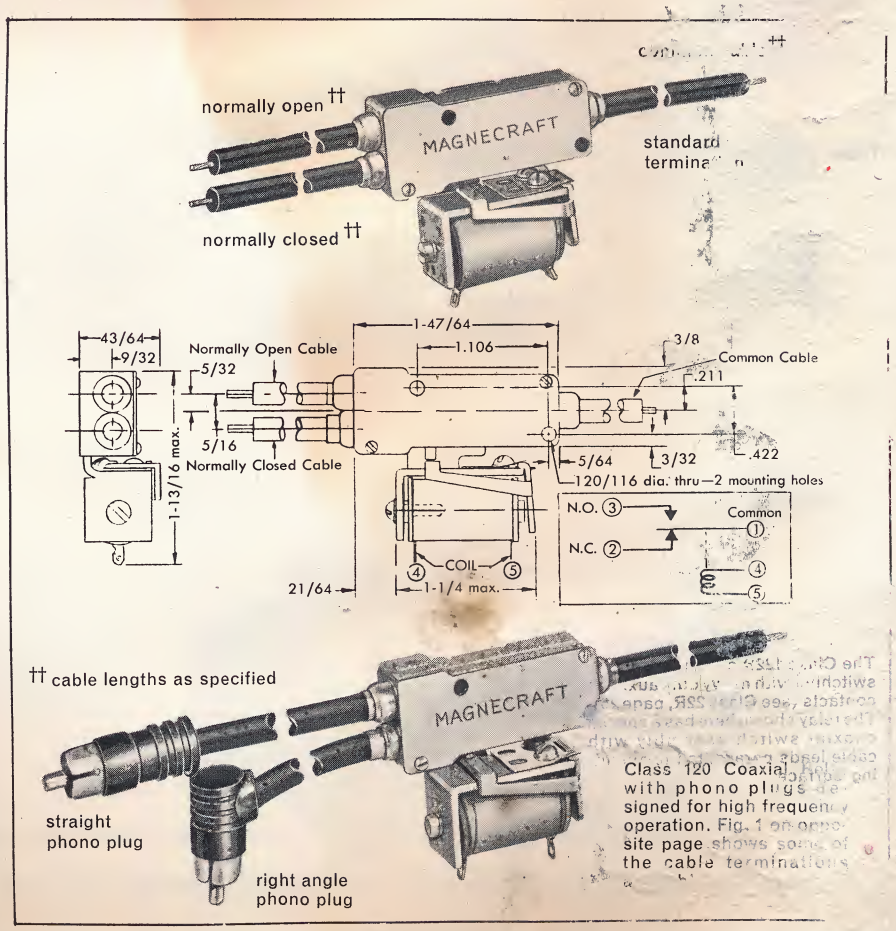
Table A—Class 120 Standard Coaxial Relays

Catalog Number	†Nom. VDC	Nom. MADC	*Resis. Ohms	Cables—RG58A/U Com'n.	NC	NO
120X-13	6	215	28	12″ long std. term.	12″ long std. term.	12″ long std. term.
120X-14	12	120	100			
120X-15	24	48	500			
120X-16	48	27	1800			
120X-17	110	17	6500			

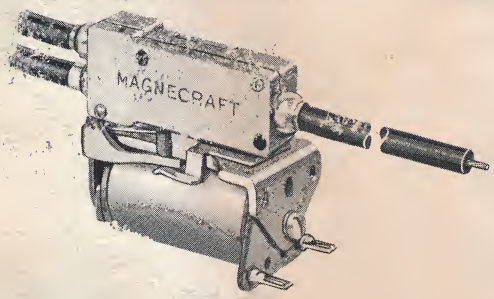
*Plus or minus 10% at +25°C

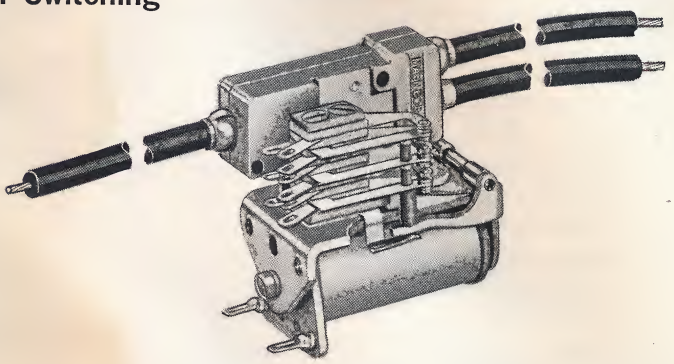
†Voltage operated relays pull in at 85% of nominal voltage

Please note all cables on above standard relays are 12 inches long with standard cable terminations. In ordering by above Catalog Numbers any deviation required from these standards must be specified.



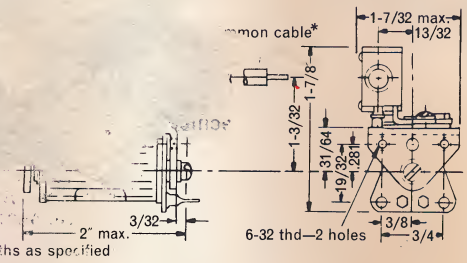
Class 122 Coaxial Relays for High Reliability UHF Switching



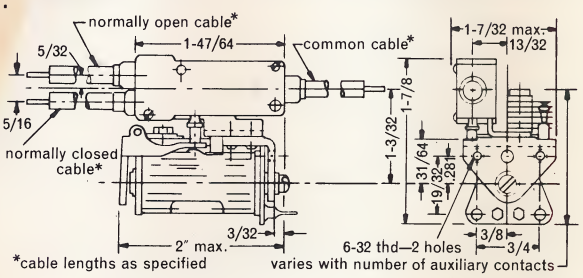


...he MAGNECRAFT Standard ...ably assembled to a Class 22 Relay basic ...ombining coaxial switching with the high ...s 22 Relays (see page 22).

Class 122 Coaxial Relays are available as illustrated above with auxiliary contacts to 3PDT for DC operation and 2PDT for AC operation (see page 23 for available contacts). Can be furnished with copper slug for Time Delay operation (see 22S, page 23) also with heavy duty contacts (see 22R page 25, also Class 122R below).

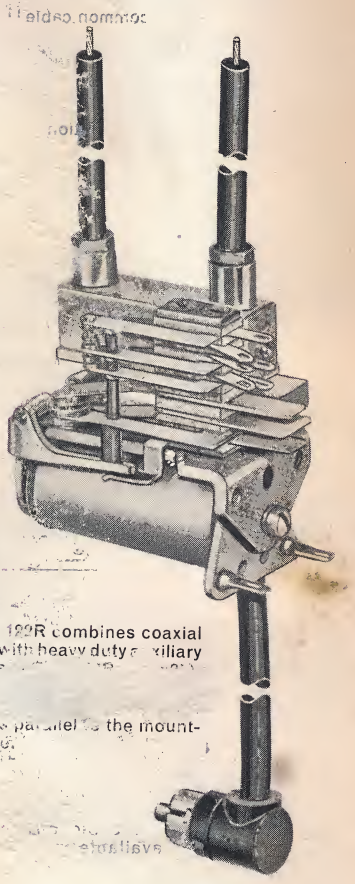


*cable lengths as specified



*cable lengths as specified
varies with number of auxiliary contacts

Class 122R Coaxial Relay



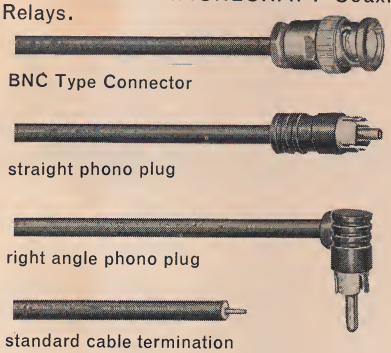
...lass 122R combines coaxial ...ng with heavy duty ...xiliary ...
... parallel to the mount-

Class 126S Coaxial Relay

(not illustrated)

Combines coaxial switching with Time Delay Features of Class 66S Relay (see page 31) with up to 3PDT auxiliary contacts for DC operation. Class 126 Coaxial Relay (*not illustrated*) utilizes Class 66 Relay basic structure (see page 30) for improved DC sensitivity and also provides AC operation with up to 3PDT auxiliary contacts.

Figure 1. Some of the Cable Terminations available with MAGNECRAFT Coaxial Relays.



Magnecraft Coaxial Relays are furnished with cables factory installed in the switch housing for proper impedence matching. Cables can be equipped with a wide selection of connectors on special order.

Ordering Information

1. Designation Number
2. Operating coil voltage or current
3. Length of Coaxial Cables
   a. Length of N.O. Cable
   b. Length of N.C. Cable
   c. Length of COMMON Cable
4. Type of connections on cables if required
5. Contact Load—RF wattage at RF frequency
6. Auxiliary Contacts:
   a. Combination required
   b. Complete load specifications

SPECIAL RELAYS—MAGNECRAFT designs and builds Relays to meet special requirements. In case you do not find the relay you need just send the complete specifications you have to meet.

The MAGNECRAFT Class 44 is a new approach to increased reliability in micro-miniature relays. Here are a few of the many areas in which great improvement has been effected:

1. Frame and header assembly of rugged, bridge-type construction. This design assures greatly increased resistance to distortion from shock, vibration and temperature.
2. Balanced armature. Minimizes the effect of gravity, shock and vibration on operating reliability.
3. Hinge design—Oversize, instrument type bearings at *BOTH* ends.
   a. Minimizes friction for increased sensitivity and greater contact pressures.
   b. Increases operating reliability and life.
4. Use of latest developments in high temperature insulation.
5. Hermetically sealed and filled with inert gas to afford maximum protection against severe ambient conditions.

Available to meet applicable military specifications

OPERATE TIME: 5 milliseconds maximum with nominal voltage on coil.

RELEASE TIME: 5 milliseconds maximum.

COIL DATA

1. Standard operating voltages are listed in Table IV. Available for intermediate and higher voltages, special.
2. D.C. Power Requirement: 500 milliwatts.
3. Resistance Range: 22 to 5,000 ohms, standard; up to 10,000 ohms, special.
4. Insulation to ground: 500 VAC R.M.S. minium. Available to 1000 VAC R.M.S.
5. Insulation Resistance: 100 megohms minimum at 500 VDC, 25° C.
6. Terminals: Solder type, plug-in and 3" leads (see diagrams on other side of sheet).

CONTACTS

1. Standard Contact Rating: 2 amps. at 28 VDC or 115 VAC non-inductive load. Available for low level and dry current switching.
2. Contact Arrangements: SPDT and DPDT.
3. Contact Life: 100,000 operations minimum at rated contact load.
4. Standard Insulation: high compression glass.

STANDARD MOUNTING: See diagrams on other side of sheet.

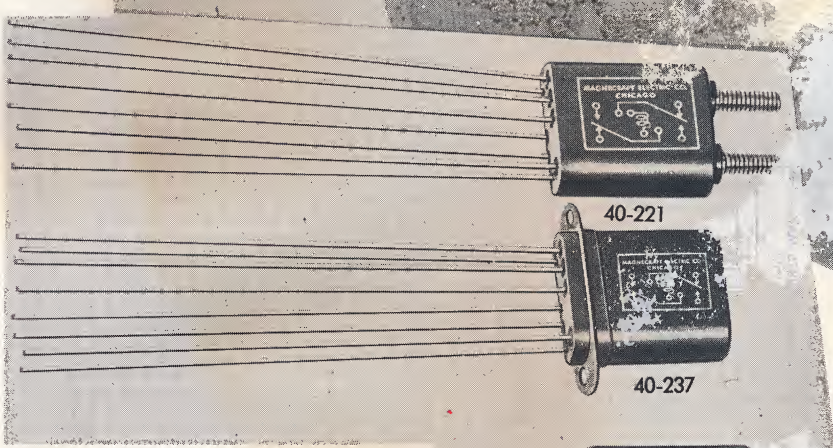
ENCLOSURE: Hermetically sealed or dust tight.

AMBIENT TEMPERATURE: —65° C. to +125° C.

VIBRATION: 10-55 cps at 10 Gs acceleration. 55-2000 cps at 20 Gs acceleration.

SHOCK: 50 Gs for 11 milliseconds (sand drop).

WEIGHT: .35 to .55 ounces.



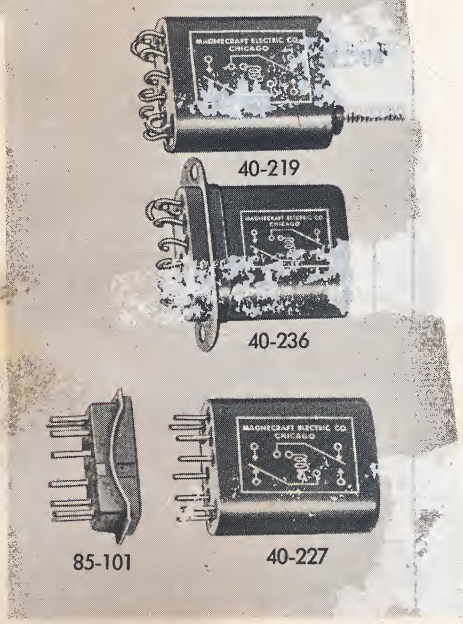


TABLE 4. Class 44 Operating Data

Volts nominal	Coil Resistance at 25° C.	
	Ohms	Tolerance ±
5.2	22	10%
6.5	34	10%
8.3	53	10%
11.0	92	10%
13.6	146	10%
16.7	215	10%
21.2	342	10%
26.5	552	10%
31.0	814	10%
38.5	1278	15%
56.0	2530	15%
76.0	5000	20%

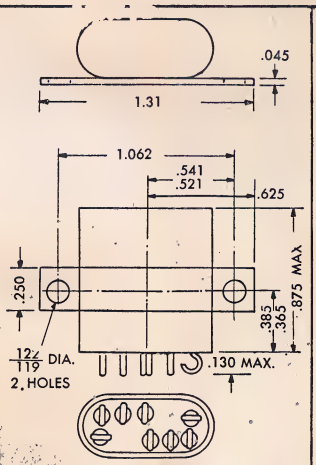
Printed in U.S.A.

re (Crystal Can) Relays

Bracketless with Solder Terminal Header

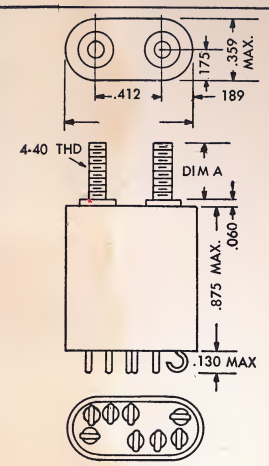
Bracketless with Lead Header

40-2x Bracketless with Plug-in Header



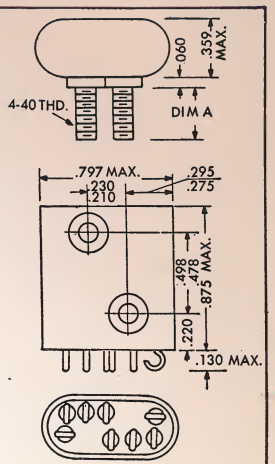
40-224 Side Bracket with Solder Terminal Header

40-226 Side Bracket with 3" Lead Header



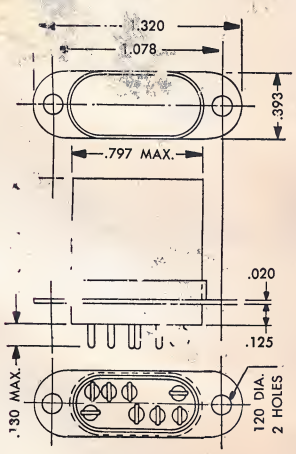
40-219 Top Studs with Solder Terminal Header
40-219-1: Dim. A, .375
40-219-2: Dim. A, .250

40-221 Top Studs with 3" Lead Header
40-221-1: Dim. A, .375
40-221-2: Dim. A, .250



40-223 Side Studs with Solder Terminal Header
40-223-1: Dim. A, .375
40-223-2: Dim. A, .250

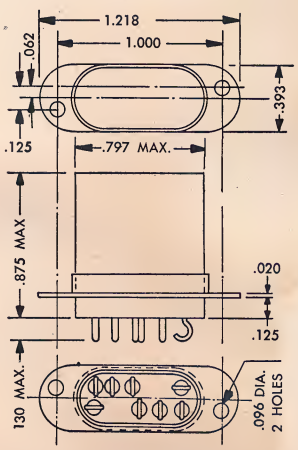
40-229 Side Studs with 3" Lead Header
40-229-1: Dim. A, .375
40-229-2: Dim. A, .250



Flange Bracket with in line mounting and Solder Terminal Header

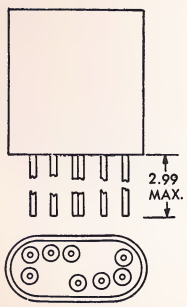
Flange Bracket with

40-235 in line mounting and 3" Lead Header

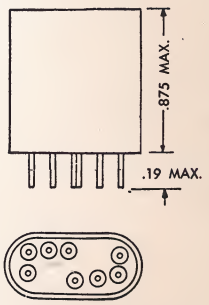


40-236 Flange Bracket with offset mounting and Solder Terminal Header

40-237 Flange Bracket with offset mounting and 3" Lead Header

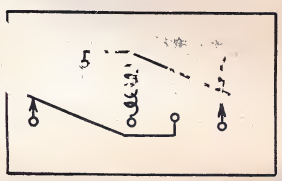


3" Lead Header furnished with 40-228, 40-226, 40-221 40-229, 40-235 and 40-237



Plug-in Header furnished with 40-227.

Mates with Magnecraft Socket No. 85-101

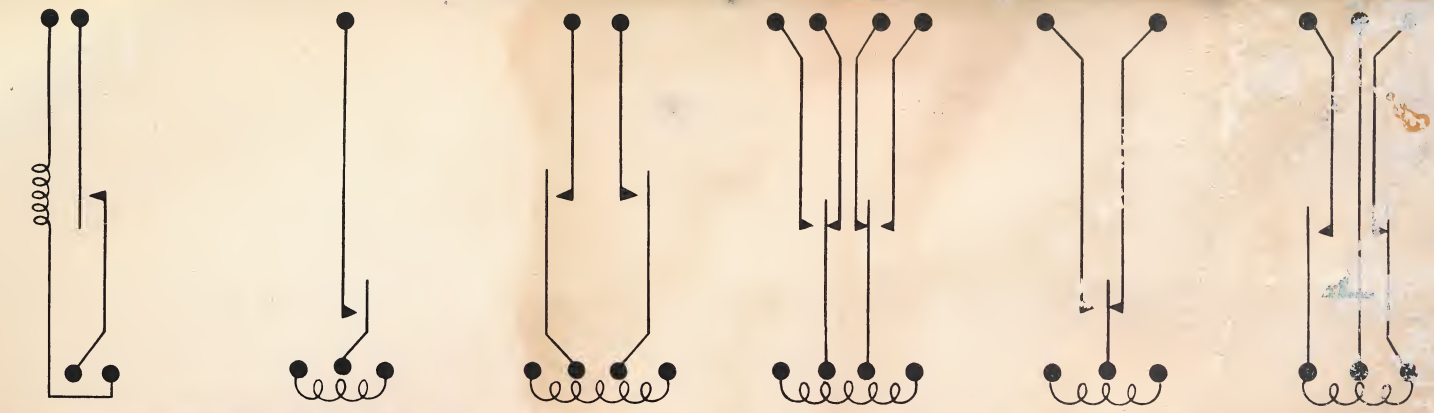


Standard Contact Arrangement

Table A—Class 44 Relays—in stock for immediate shipment

			Stock Part Numbers			
†DC volt.	* res. ohms	nominal power	enclosure 40-227	enclosure 40-222	enclosure 40-224	enclosure 40-234
6.5	34		W44HPX-34	W44HSX-103	W44HSX-108	W44HSX-113
11	92		W44HPX-35	W44HSX-104	W44HSX-109	W44HSX-114
26.5	552	1.2W	W44HPX-36	W44HSX-105	W44HSX-110	W44HSX-115
38.5	1278		W44HPX-37	W44HSX-106	W44HSX-111	W44HSX-116
76	5000		W44HPX-38	W44HSX-107	W44HSX-112	W44HSX-117

*Plus or minus 10% at +25°C
†Voltage operated relays pull in at 85% of nominal voltage



Plant of MAGNECRAFT ELECTRIC CO., designed and built especially for the manufacture of HIGH RELIABILITY relays. This plant is completely air conditioned to produce atmosphere of hospital like sterility. From drawing board to shipping package MAGNECRAFT RELAYS have minimum exposure to dust and contamination.